TABLES

FOR FACILITATING

THE SOLUTION OF A VERY USEFUL PROBLEM,

FOR FINDING

THE LATITUDE OF A SHIP AT SEA,

HAVING THE LATITUDE BY ACCOUNT,

TWO OBSERVED ALTITUDES OF THE SUN,

THE TIME ELAPSED BETWEEN THE OBSERVATIONS MEASURED BY A COMMON WATCH,

AND THE

DECLINATION OF THE SUN;

WITH

PRECEPTS AND EXAMPLES:

LONDON:

PRINTED BY W. AND J. RICHARDSON.

M DCC LXIX.

ЭКЗЕМПЛЯР

ГОМЕР

ГАЛЛЕС

TABLES

FOR FACILITATING

THE SOLUTION OF A VERY USEFUL PROBLEM, &c.

PRECEPTS.

TO the Arithmetical Complement of the Logarithm Cosine of the Latitude by Account, add the Arithmetical Complement of the Logarithm Cosine of the Sun's Declination: call their Sum the Log. Ratio.

From the Natural Sine of the greateſt Altitude, ſubtract the Natural Sine of the leaſt Altitude: Find the Logarithm of their Difference, and write it under Log. Ratio.

With Half the elapſed Time enter theſe TABLES, and from the Column of $\frac{1}{2}$ *elap. Time*, take out the Logarithm anſwering thereto, which is alſo to be ſet down under Log. Ratio.

Add theſe Three Logarithms together, and with their Sum enter theſe Tables, in the Column of *Mid. Time*; where having found the Logarithm neareſt thereto, take out the Time correſponding to it, and put it down under Half the elapſed Time. Subtract the leſſer from the greater, their Difference will be the *Time from Noon* when the *greateſt Altitude* was taken.

With this Time enter theſe Tables, and from the Column of *Log. Riſing* take out the Logarithm correſponding thereto: From this Logarithm ſubtract the *Log. Ratio*, the Remainder will be the Logarithm of a *Natural Number*, which being found in any common Table of Logarithms, and added to the *Natural Sine* of the *greateſt Altitude*, will give the *Natural Sine* of the Meridian Altitude of the Sun.

From the Meridian Altitude of the Sun, the Latitude of the Place of Obſervation is to be obtained in the uſual Manner.

N. B. If the Latitude found by the above Proceſs ſhould differ widely from the Latitude by Account, it will be proper to repeat the Operation, uſing the Latitude laſt found, inſtead of the Latitude by Account, till the Reſult gives a Latitude nearly agreeing with the Latitude uſed in the Computation.

☞ See the EXAMPLES at the End of the TABLES.

M.	S.	Log. ½elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rif. ing.	Differ. ence.
0	0					
	10	3. 13833	30103	2. 16270	$\bar{2}$ .42230	60206
	20	2. 83730	17609	2. 46373	$\bar{1}$ .02436	35218
	30	2. 66121	12494	2. 63982	$\bar{1}$ .37654	24988
	40	2. 53627	9691	2. 76476	$\bar{1}$ .62642	19382
	50	2. 43936		2. 86167	$\bar{1}$ .82024	
			7918			15836
1	0	2. 36018	6694	2. 94085	$\bar{1}$ .97860	13390
	10	2. 29324	5799	3. 00779	0. 11250	11598
	20	2. 23525	5116	3. 06578	0. 22848	10231
	30	2. 18409	4575	3. 11694	0. 33079	9151
	40	2. 13834	4139	3. 16269	0. 42230	8279
	50	2. 09695		3. 20408	0. 50509	
			3779			7557
2	0	2. 05916	3476	3. 24187	0. 58066	6953
	10	2. 02440	3219	3. 27663	0. 65019	6436
	20	1. 99221	2996	3. 30882	0. 71455	5993
	30	1. 96225	2803	3. 33878	0. 77448	5606
	40	1. 93422	2632	3. 36681	0. 83054	5265
	50	1. 90790		3. 39313	0. 88319	
			2483			4965
3	0	1. 88307	2348	3. 41796	0. 93284	4596
	10	1. 85959	2227	3. 44144	0. 97980	4455
	20	1. 83732	2119	3. 46371	1. 02435	4238
	30	1. 81613	2020	3. 48490	1. 06673	4041
	40	1. 79593	1930	3. 50510	1. 10714	3861
	50	1. 77663		3. 52440	1. 14575	
			1849			3696
4	0	1. 75814	1772	3. 54289	1. 18271	3546
	10	1. 74042	1703	3. 56061	1. 21817	3407
	20	1. 72339	1639	3. 57764	1. 25224	3278
	30	1. 70700	1579	3. 59403	1. 28502	3158
	40	1. 69121	1524	3. 60982	1. 31660	3048
	50	1. 67597		3. 62506	1. 34708	
			1472			2945
5	0	1. 66125	1424	3. 63978	1. 37653	2848
	10	1. 64701	1379	3. 65402	1. 40501	2757
	20	1. 63322	1336	3. 66781	1. 43258	2673
	30	1. 61986	1296	3. 68117	1. 45931	2593
	40	1. 60690	1259	3. 69413	1. 48524	2517
	50	1. 59431		3. 70672	1. 51041	
			1223			2474

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference
6	0	1. 58208		3. 71895	1. 53488	
			1190			2380
	10	1. 57018		3. 73085	1. 55868	
			1157			2316
	20	1. 55861		3. 74242	1. 58184	
			1128			2256
	30	1. 54733		3. 75370	1. 60440	
			1099			2199
	40	1. 53634		3. 76469	1. 62639	
			1073			2145
	50	1. 52561		3. 77542	1. 64784	
			1046			2093
7	0	1. 51515		3. 75888	1. 66877	
			1021			2043
	10	1. 50494		3. 79609	1. 68920	
			998			1997
	20	1. 49496		3. 80607	1. 70917	
			976			1952
	30	1. 48520		3. 81583	1. 72869	
			954			1909
	40	1. 47566		3. 82537	1. 74778	
			934			1868
	50	1. 46632		3. 83471	1. 76646	
			914			1828
8	0	1. 45718		3. 84385	1. 78474	
			895			1791
	10	1. 44823		3. 85280	1. 80265	
			877			1754
	20	1. 43946		3. 86157	1. 82019	
			860			1720
	30	1. 43086		3. 87017	1. 83739	
			843			1687
	40	1. 42243		3. 87860	1. 85426	
			826			1654
	50	1. 41417		3. 88686	1. 87080	
			812			1623
9	0	1. 40605		3. 89498	1. 88703	
			796			1594
	10	1. 39809		3. 90294	1. 90297	
			782			1565
	20	1. 39027		3. 91076	1. 91862	
			769			1537
	30	1. 38258		3. 91845	1. 93399	
			755			1510
	40	1. 37503		3. 92600	1. 94909	
			741			1485
	50	1. 36762		3. 93341	1. 96394	
			730			1460
10	0	1. 36032		3. 94071	1. 97854	
			717			1435
	10	1. 35315		3. 94788	1. 99289	
			706			1410
	20	1. 34609		3. 95494	2. 00699	
			694			1392
	30	1. 33915		3. 96188	2. 02091	
			684			1367
	40	1. 33231		3. 96872	2. 03458	
			673			1347
	50	1. 32558		3. 97545	2. 04805	
			662			1326
11	0	1. 31896		3. 98207	2. 06131	
			653			1306
	10	1. 31243		3. 98860	2. 07437	
			643			1286
	20	1. 30600		3. 99503	2. 08723	
			633			1268
	30	1. 29967		4. 00136	2. 09991	
			625			1249
	40	1. 29342		4. 00761	2. 11240	
			615			1232
	50	1. 28727		4. 01376	2. 12472	
			607			1215

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
12	0	1. 28120		4. 01983	2. 13687	
			598			1198
	10	1. 27522		4. 02581	2. 14885	
			591			1181
	20	1. 26931		4. 03172	2. 16066	
			582			1166
	30	1. 26349		4. 03754	2. 17223	
			575			1150
	40	1. 25774		4. 04329	2. 18382	
			567			1135
	50	1. 25207		4. 04896	2. 19517	
			560			1121
13	0	1. 24647		4. 05456	2. 20638	
			552			1106
	10	1. 24095		4. 06008	2. 21744	
			546			1092
	20	1. 23549		4. 06554	2. 22836	
			539			1079
	30	1. 23010		4. 07093	2. 23915	
			533			1065
	40	1. 22477		4. 07626	2. 24980	
			525			1053
	50	1. 21952		4. 08251	2. 26033	
			520			1040
14	0	1. 21432		4. 08671	2. 27073	
			513			1027
	10	1. 20919		4. 09184	2. 28100	
			507			1016
	20	1. 20412		4. 09691	2. 29116	
			502			1004
	30	1. 19910		4. 10193	2. 30120	
			495			992
	40	1. 19415		4. 10688	2. 31112	
			490			981
	50	1. 18925		4. 11178	2. 32093	
			485			970
15	0	1. 18440		4. 11663	2. 33063	
			479			960
	10	1. 17961		4. 12142	2. 34023	
			474			949
	20	1. 17487		4. 12616	2. 34972	
			469			938
	30	1. 17018		4. 13085	2. 35910	
			464			929
	40	1. 16554		4. 13549	2. 36839	
			458			919
	50	1. 16096		4. 14007	2. 37758	
			454			909
16	0	1. 15642		4. 14461	2. 38667	
			450			900
	10	1. 15192		4. 14911	2. 39567	
			444			890
	20	1. 14748		4. 15355	2. 40457	
			441			881
	30	1. 14307		4. 15796	2. 41338	
			435			873
	40	1. 13872		4. 16231	2. 42211	
			432			864
	50	1. 13440		4. 16663	2. 43075	
			427			855
17	0	1. 13013		4. 17090	2. 43930	
			423			847
	10	1. 12590		4. 17513	2. 44777	
			419			839
	20	1. 12171		4. 17932	2. 45616	
			414			831
	30	1. 11757		4. 18346	2. 46447	
			411			823
	40	1. 11346		4. 18757	2. 47270	
			407			815
	50	1. 10939		4. 19164	2. 48085	
			403			808

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
18	0	1. 10536		4. 19567	2. 48893	
	10	1. 10136	400	4. 19967	2. 49693	800
	20	1. 09740	396	4. 20363	2. 50486	793
	30	1. 09348	392	4. 20755	2. 51271	785
	40	1. 08960	388	4. 21143	2. 52050	779
	50	1. 08575	385	4. 21528	2. 52821	771
			382			765
19	0	1. 08193		4. 21910	2. 53586	
	10	1. 07814	379	4. 22289	2. 54344	758
	20	1. 07439	375	4. 22664	2. 55096	752
	30	1. 07067	372	4. 23036	2. 55841	745
	40	1. 06698	369	4. 23405	2. 56580	739
	50	1. 06333	363	4. 23770	2. 57312	732
			363			727
20	0	1. 05970		4. 24133	2. 58039	
	10	1. 05610	360	4. 24493	2. 58759	720
	20	1. 05254	356	4. 24849	2. 59473	716
	30	1. 04901	353	4. 25202	2. 60182	709
	40	1. 04550	351	4. 25553	2. 60885	703
	50	1. 04202	348	4. 25901	2. 61582	697
			345			692
21	0	1. 03857		4. 26246	2. 62274	
	10	1. 03515	342	4. 26588	2. 62960	686
	20	1. 03175	340	4. 26928	2. 63641	681
	30	1. 02838	337	4. 27265	2. 64316	675
	40	1. 02504	334	4. 27599	2. 64987	671
	50	1. 02172	332	4. 27931	2. 65652	665
			329			660
22	0	1. 01843		4. 28260	2. 66312	
	10	1. 01516	327	4. 28587	2. 66967	655
	20	1. 01192	324	4. 28911	2. 67617	650
	30	1. 00870	322	4. 29233	2. 68262	645
	40	1. 00550	320	4. 29553	2. 68903	641
	50	1. 00233	317	4. 29870	2. 69538	635
			315			631
23	0	0. 99918		4. 30185	2. 70169	
	10	0. 99606	312	4. 30497	2. 70796	627
	20	0. 99296	310	4. 30807	2. 71418	622
	30	0. 98988	308	4. 31115	2. 72036	618
	40	0. 98682	306	4. 31421	2. 72649	613
	50	0. 98378	304	4. 31725	2. 73258	609
			301			605

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
24	0	0. 98077		4. 32026	2. 73863	
			300			601
	10	0. 97777		4. 32326	2. 74464	
			297			596
	20	0. 97480		4. 32623	2. 75060	
			296			592
	30	0. 97184		4. 32919	2. 75652	
			293			589
	40	0. 96891		4. 33212	2. 76241	
			291			584
	50	0. 96600		4. 33503	2. 76825	
			290			580
25	0	0. 96310		4. 33793	2. 77405	
			287			577
	10	0. 96023		4. 34080	2. 77982	
			285			573
	20	0. 95738		4. 34365	2. 78555	
			284			569
	30	0. 95454		4. 34649	2. 79124	
			282			565
	40	0. 95172		4. 34931	2. 79689	
			280			562
	50	0. 94892		4. 35211	2. 80251	
			278			558
26	0	0. 94614		4. 35489	2. 80809	
			276			554
	10	0. 94338		4. 35765	2. 81363	
			275			551
	20	0. 94063		4. 36040	2. 81914	
			273			547
	30	0. 93790		4. 36313	2. 82461	
			271			544
	40	0. 93519		4. 36584	2. 83005	
			269			541
	50	0. 93250		4. 36853	2. 83546	
			268			537
27	0	0. 92982		4. 37121	2. 84083	
			266			534
	10	0. 92716		4. 37387	2. 84617	
			264			531
	20	0. 92452		4. 37651	2. 85148	
			263			527
	30	0. 92189		4. 37914	2. 85675	
			261			524
	40	0. 91928		4. 38175	2. 86199	
			259			521
	50	0. 91669		4. 38434	2. 86720	
			258			518
28	0	0. 91411		4. 38692	2. 87238	
			257			515
	10	0. 91154		4. 38949	2. 87753	
			255			512
	20	0. 90899		4. 39204	2. 88265	
			253			508
	30	0. 90646		4. 39457	2. 88773	
			252			506
	40	0. 90394		4. 39709	2. 89279	
			251			503
	50	0. 90143		4. 39960	2. 89782	
			249			500
29	0	0. 89894		4. 40209	2. 90282	
			247			497
	10	0. 89647		4. 40456	2. 90779	
			246			494
	20	0. 89401		4. 40702	2. 91273	
			245			492
	30	0. 89156		4. 40947	2. 91765	
			243			489
	40	0. 88913		4. 41190	2. 92254	
			242			486
	50	0. 88671		4. 41432	2. 92740	
			241			483

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
30	0	0. 88430		4. 41673	2. 93223	
	10	0. 88191	239	4. 41912	2. 93703	481
	20	0. 87953	238	4. 42150	2. 94181	478
	30	0. 87717	236	4. 42386	2. 94656	475
	40	0. 87481	236	4. 42622	2. 95129	473
	50	0. 87247	234	4. 42856	2. 95599	470
			232			468
31	0	0. 87015		4. 43088	2. 96067	
	10	0. 86783	232	4. 43320	2. 96532	465
	20	0. 86553	230	4. 43550	2. 96994	462
	30	0. 86324	229	4. 43779	2. 97454	460
	40	0. 86096	228	4. 44007	2. 97912	458
	50	0. 85870	226	4. 44233	2. 98367	455
			226			453
32	0	0. 85644		4. 44459	2. 98820	
	10	0. 85420	224	4. 44683	2. 99270	450
	20	0. 85197	223	4. 44906	2. 99718	448
	30	0. 84976	221	4. 45127	3. 00164	446
	40	0. 84755	221	4. 45348	3. 00608	444
	50	0. 84535	220	4. 45568	3. 01049	441
			218			439
33	0	0. 84317		4. 45786	3. 01488	
	10	0. 84100	217	4. 46003	3. 01925	437
	20	0. 83884	216	4. 46219	3. 02360	435
	30	0. 83669	215	4. 46434	3. 02792	432
	40	0. 83455	214	4. 46648	3. 03222	430
	50	0. 83242	213	4. 46861	3. 03650	428
			212			427
34	0	0. 83030		4. 47073	3. 04077	
	10	0. 82819	211	4. 47284	3. 04501	424
	20	0. 82609	210	4. 47494	3. 04922	421
	30	0. 82401	208	4. 47702	3. 05342	420
	40	0. 82193	208	4. 47910	3. 05760	418
	50	0. 81986	207	4. 48117	3. 06176	416
			206			414
35	0	0. 81780		4. 48323	3. 06590	
	10	0. 81576	204	4. 48527	3. 07001	411
	20	0. 81372	204	4. 48731	3. 07411	410
	30	0. 81169	203	4. 48934	3. 07819	408
	40	0. 80967	202	4. 49136	3. 08225	406
	50	0. 80767	200	4. 49336	3. 08630	405
			200			402

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
36	0	0. 80567		4. 49536	3. 09032	
	10	0. 80368	199	4. 49735	3. 09432	400
	20	0. 80170	198	4. 49933	3. 09830	398
	30	0. 79973	197	4. 50130	3. 10227	397
	40	0. 79777	196	4. 50326	3. 10622	395
	50	0. 79581	196	4. 50522	3. 11015	393
			194			391
37	0	0. 79387		4. 50716	3. 11406	
	10	0. 79193	194	4. 50910	3. 11796	390
	20	0. 79001	192	4. 51102	3. 12184	388
	30	0. 78809	192	4. 51294	3. 12570	386
	40	0. 78618	191	4. 51485	3. 12954	384
	50	0. 78428	190	4. 51675	3. 13337	383
			189			381
38	0	0. 78239		4. 51864	3. 13718	
	10	0. 78051	188	4. 52052	3. 14097	379
	20	0. 77863	188	4. 52240	3. 14475	378
	30	0. 77677	186	4. 52426	3. 14850	375
	40	0. 77491	186	4. 52612	3. 15225	375
	50	0. 77306	185	4. 52797	3. 15597	372
			184			372
39	0	0. 77122		4. 52981	3. 15969	
	10	0. 76938	184	4. 53165	3. 16338	369
	20	0. 76756	182	4. 53347	3. 16706	368
	30	0. 76574	182	4. 53529	3. 17072	366
	40	0. 76393	181	4. 53710	3. 17437	365
	50	0. 76212	181	4. 53891	3. 17800	363
			179			362
40	0	0. 76033		4. 54070	3. 18162	
	10	0. 75854	179	4. 54249	3. 18522	360
	20	0. 75676	178	4. 54427	3. 18881	359
	30	0. 75499	177	4. 54604	3. 19238	357
	40	0. 75323	176	4. 54780	3. 19594	356
	50	0. 75147	176	4. 54956	3. 19948	354
			175			353
41	0	0. 74972		4. 55131	3. 20301	
	10	0. 74797	175	4. 55306	3. 20653	352
	20	0. 74624	173	4. 55479	3. 21003	350
	30	0. 74451	173	4. 55652	3. 21351	348
	40	0. 74279	172	4. 55824	3. 21698	347
	50	0. 74107	172	4. 55996	3. 22044	346
			170			345

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
42	0	0. 73937	170	4. 56166	3. 22389	
	10	0. 73767	170	4. 56336	3. 22732	343
	20	0. 73597	168	4. 56506	3. 23073	341
	30	0. 73429	168	4. 56674	3. 23414	341
	40	0. 73261	168	4. 56842	3. 23753	339
	50	0. 73093		4. 57010	3. 24090	337
			167			337
43	0	0. 72926	166	4. 57177	3. 24427	
	10	0. 72760	165	4. 57343	3. 24762	335
	20	0. 72595	165	4. 57508	3. 25095	333
	30	0. 72430	164	4. 57673	3. 25428	333
	40	0. 72266	163	4. 57837	3. 25759	331
	50	0. 72103		4. 58000	3. 26089	330
			163			329
44	0	0. 71940	162	4. 58163	3. 26418	
	10	0. 71778	162	4. 58325	3. 26745	327
	20	0. 71616	161	4. 58487	3. 27072	327
	30	0. 71455	160	4. 58648	3. 27396	324
	40	0. 71295	160	4. 58808	3. 27720	324
	50	0. 71135		4. 58968	3. 28042	322
			159			321
45	0	0. 70976	158	4. 59127	3. 28363	
	10	0. 70818	158	4. 59285	3. 28683	320
	20	0. 70660	157	4. 59443	3. 29002	319
	30	0. 70503	157	4. 59600	3. 29320	318
	40	0. 70346	156	4. 59751	3. 29637	317
	50	0. 70190		4. 59913	3. 29952	315
			156			314
46	0	0. 70034	155	4. 60069	3. 30266	
	10	0. 69879	154	4. 60224	3. 30579	313
	20	0. 69725	154	4. 60378	3. 30891	312
	30	0. 69571	153	4. 60532	3. 31202	311
	40	0. 69418	153	4. 60685	3. 31512	310
	50	0. 69265		4. 60838	3. 31820	308
			152			308
47	0	0. 69113	151	4. 60990	3. 32128	
	10	0. 68962	151	4. 61141	3. 32434	306
	20	0. 68811	151	4. 61292	3. 32739	305
	30	0. 68660	150	4. 61443	3. 33044	305
	40	0. 68510	149	4. 61593	3. 33347	303
	50	0. 68361		4. 61742	3. 33649	302
			149			301

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
48	0	0.68212		4.61891	3.33950	
			148			300
	10	0.68064		4.62039	3.34250	
			148			299
	20	0.67916		4.62187	3.34549	
			147			298
	30	0.67769		4.62334	3.34847	
			147			297
	40	0.67622		4.62481	3.35144	
			146			295
	50	0.67476		4.62627	3.35439	
			146			295
49	0	0.67330		4.62773	3.35734	
			145			294
	10	0.67185		4.62918	3.36028	
			145			293
	20	0.67040		4.63063	3.36321	
			144			292
	30	0.66896		4.63207	3.36613	
			144			290
	40	0.66752		4.63351	3.36903	
			143			290
	50	0.66609		4.63494	3.37193	
			143			289
50	0	0.66466		4.63637	3.37482	
			142			288
	10	0.66324		4.63779	3.37770	
			142			287
	20	0.66182		4.63921	3.38057	
			141			286
	30	0.66041		4.64062	3.38343	
			141			285
	40	0.65900		4.64203	3.58628	
			140			284
	50	0.65760		4.64343	3.38912	
			140			283
51	0	0.65620		4.64483	3.39195	
			139			282
	10	0.65481		4.64622	3.39477	
			139			282
	20	0.65342		4.64761	3.39759	
			138			280
	30	0.65204		4.64899	3.40039	
			138			279
	40	0.65066		4.65037	3.40318	
			138			279
	50	0.64928		4.65175	3.40597	
			137			278
52	0	0.64791		4.65312	3.40875	
			136			276
	10	0.64655		4.65448	3.41151	
			136			276
	20	0.64519		4.65584	3.41427	
			136			275
	30	0.64383		4.65720	3.41702	
			135			274
	40	0.64248		4.65855	3.41976	
			135			274
	50	0.64113		4.65990	3.42250	
			135			273
53	0	0.63978		4.66125	3.42523	
			134			271
	10	0.63844		4.66259	3.42794	
			133			270
	20	0.63711		4.66392	3.43064	
			133			270
	30	0.63578		4.66525	3.43334	
			133			269
	40	0.63445		4.66658	3.43603	
			132			268
	50	0.63313		4.66790	3.43871	
			132			267

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
54	0	0.63181		4.66922	3.44138	
	10	0.63050	131	4.67053	3.44404	266
	20	0.62919	131	4.67184	3.44670	266
	30	0.62789	130	4.67314	3.44935	265
	40	0.62659	130	4.67444	3.45199	264
	50	0.62529	130	4.67574	3.45462	263
			129			262
55	0	0.62400		4.67703	3.45724	
	10	0.62271	129	4.67832	3.45986	262
	20	0.62142	129	4.67961	3.46247	261
	30	0.62014	128	4.68089	3.46507	260
	40	0.61886	128	4.68217	3.46765	258
	50	0.61759	127	4.68344	3.47024	259
			127			258
56	0	0.61632		4.68471	3.47282	
	10	0.61506	126	4.68597	3.47539	257
	20	0.61380	126	4.68723	3.47795	256
	30	0.61254	126	4.68849	3.48050	255
	40	0.61129	125	4.68974	3.48305	255
	50	0.61004	125	4.69099	3.48558	253
			125			253
57	0	0.60879		4.69224	3.48811	
	10	0.60755	124	4.69348	3.49064	253
	20	0.60631	124	4.69472	3.49315	251
	30	0.60508	123	4.69595	3.49566	251
	40	0.60385	123	4.69718	3.49816	250
	50	0.60262	123	4.69841	3.50066	250
			122			248
58	0	0.60140		4.69963	3.50314	
	10	0.60018	122	4.70085	3.50562	248
	20	0.59896	122	4.70207	3.50809	247
	30	0.59775	121	4.70328	3.51056	247
	40	0.59654	121	4.70449	3.51301	245
	50	0.59534	120	4.70569	3.51547	246
			120			244
59	0	0.59414		4.70689	3.51791	
	10	0.59294	120	4.70809	3.52035	244
	20	0.59175	119	4.70928	3.52278	243
	30	0.59056	119	4.71047	3.52520	242
	40	0.58937	119	4.71166	3.52761	241
	50	0.58818	119	4.71285	3.53002	241
			118			241

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
0	0	0. 58700	118	4. 71403	3. 53243	239
	10	0. 58582	117	4. 71521	3. 53482	239
	20	0. 58465	117	4. 71638	3. 53721	238
	30	0. 58348	117	4. 71755	3. 53959	238
	40	0. 58231	116	4. 71872	3. 54197	237
	50	0. 58115	116	4. 71988	3. 54434	236
1	0	0. 57999	116	4. 72104	3. 54670	235
	10	0. 57883	115	4. 72220	3. 54905	235
	20	0. 57768	115	4. 72335	3. 55140	235
	30	0. 57653	115	4. 72450	3. 55375	233
	40	0. 57538	114	4. 72565	3. 55608	233
	50	0. 57424	114	4. 72679	3. 55841	233
2	0	0. 57310	114	4. 72793	3. 56074	232
	10	0. 57196	113	4. 72907	3. 56306	231
	20	0. 57083	113	4. 73020	3. 56537	230
	30	0. 56970	113	4. 73133	3. 56767	230
	40	0. 56857	112	4. 73246	3. 56997	229
	50	0. 56745	112	4. 73358	3. 57226	229
3	0	0. 56633	112	4. 73470	3. 57455	228
	10	0. 56521	112	4. 73582	3. 57683	227
	20	0. 56409	111	4. 73694	3. 57910	227
	30	0. 56298	111	4. 73805	3. 58137	226
	40	0. 56187	111	4. 73916	3. 58363	226
	50	0. 56076	110	4. 74027	3. 58589	225
4	0	0. 55966	110	4. 74137	3. 58814	224
	10	0. 55856	110	4. 74247	3. 59038	224
	20	0. 55746	109	4. 74357	3. 59262	224
	30	0. 55637	109	4. 74466	3. 59486	222
	40	0. 55528	109	4. 74575	3. 59708	222
	50	0. 55419	108	4. 74684	3. 59930	222
5	0	0. 55311	108	4. 74792	3. 60152	221
	10	0. 55203	108	4. 74900	3. 60373	220
	20	0. 55095	108	4. 75008	3. 60593	220
	30	0. 54987	107	4. 75116	3. 60813	219
	40	0. 54880	107	4. 75223	3. 61032	219
	50	0. 54773	107	4. 75330	3. 61251	218

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
6	0	0.54666		4.75437	3.61469	
	10	0.54559	107	4.75544	3.61686	217
	20	0.54453	106	4.75650	3.61903	217
	30	0.54347	106	4.75756	3.62120	217
	40	0.54241	106	4.75862	3.62336	216
	50	0.54136	105	4.75967	3.62551	215
7	0	0.54031	105	4.76072	3.62766	215
	10	0.53926	105	4.76177	3.62980	214
	20	0.53822	104	4.76281	3.63194	214
	30	0.53718	104	4.76385	3.63407	213
	40	0.53614	104	4.76489	3.63620	213
	50	0.53510	104	4.76593	3.63832	212
8	0	0.53406	104	4.76697	3.64043	211
	10	0.53303	103	4.76800	3.64254	211
	20	0.53200	103	4.76903	3.64465	211
	30	0.53097	103	4.77006	3.64675	210
	40	0.52995	102	4.77108	3.64885	210
	50	0.52893	102	4.77210	3.65094	209
9	0	0.52791	102	4.77312	3.65302	208
	10	0.52690	101	4.77413	3.65510	208
	20	0.52589	101	4.77514	3.65717	207
	30	0.52488	101	4.77615	3.65924	207
	40	0.52387	101	4.77716	3.66131	207
	50	0.52286	101	4.77817	3.66337	206
10	0	0.52186	100	4.77917	3.66542	205
	10	0.52086	100	4.78017	3.66747	205
	20	0.51986	100	4.78117	3.66952	205
	30	0.51886	100	4.78217	3.67156	204
	40	0.51787	99	4.78316	3.67359	203
	50	0.51688	99	4.78415	3.67562	203
11	0	0.51589	99	4.78514	3.67756	202
	10	0.51490	98	4.78613	3.67967	201
	20	0.51392	98	4.78711	3.68168	201
	30	0.51294	98	4.78809	3.68369	201
	40	0.51196	97	4.78907	3.68570	200
	50	0.51099	97	4.79004	3.68770	199

M.	S.	Log. ½elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
12	0	0. 51002		4. 79101	3. 68969	
	10	0. 50905	97	4. 79198	3. 69169	200
	20	0. 50808	97	4. 79295	3. 69367	198
	30	0. 50711	97	4. 79392	3. 69566	199
	40	0. 50615	96	4. 79488	3. 69763	197
	50	0. 50519	96	4. 79584	3. 69961	198
			96			197
13	0	0. 50423		4. 79680	3. 70158	
	10	0. 50327	96	4. 79776	3. 70354	196
	20	0. 50232	95	4. 79871	3. 70550	196
	30	0. 50137	95	4. 79966	3. 70745	195
	40	0. 50042	95	4. 80061	3. 70940	195
	50	0. 49947	95	4. 80156	3. 71135	195
			95			194
14	0	0. 49852		4. 80251	3. 71329	
	10	0. 49758	94	4. 80345	3. 71523	194
	20	0. 49664	94	4. 80439	3. 71716	193
	30	0. 49570	94	4. 80533	3. 71909	193
	40	0. 49476	94	4. 80627	3. 72101	192
	50	0. 49383	93	4. 80720	3. 72293	192
			93			192
15	0	0. 49290		4. 80813	3. 72485	
	10	0. 49197	93	4. 80906	3. 72676	191
	20	0. 49104	93	4. 80999	3. 72867	191
	30	0. 49012	92	4. 81091	3. 73057	190
	40	0. 48920	92	4. 81183	3. 73247	190
	50	0. 48828	92	4. 81275	3. 73436	189
			92			189
16	0	0. 48736		4. 81367	3. 73625	
	10	0. 48644	92	4. 81459	3. 73813	188
	20	0. 48553	91	4. 81550	3. 74001	188
	30	0. 48462	91	4. 81641	3. 74189	188
	40	0. 48371	91	4. 81732	3. 74376	1 7
	50	0. 48280	91	4. 81823	3. 74563	187
			91			187
17	0	0. 48189		4. 81914	3. 74750	
	10	0. 48099	90	4. 82004	3. 74936	186
	20	0. 48009	90	4. 82094	3. 75121	185
	30	0. 47919	90	4. 82184	3. 75307	186
	40	0. 47829	90	4. 82274	3. 75491	184
	50	0. 47739	90	4. 82364	3. 75676	185
			89			184

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference
18	0	0.47650		4.82453	3.75860	
			89			183
	10	0.47561		4.82542	3.76043	
			89			184
	20	0.47472		4.82631	3.76227	
			89			182
	30	0.47383		4.82720	3.76409	
			88			183
	40	0.47295		4.82808	3.76592	
			88			182
	50	0.47207		4.82896	3.76774	
			88			181
19	0	0.47119		4.82984	3.76955	
			88			182
	10	0.47031		4.83072	3.77137	
			88			181
	20	0.46943		4.83160	3.77318	
			87			180
	30	0.46856		4.83247	3.77498	
			87			180
	40	0.46769		4.83334	3.77678	
			87			180
	50	0.46682		4.83421	3.77858	
			87			179
20	0	0.46595		4.83508	3.78037	
			87			179
	10	0.46508		4.83595	3.78216	
			87			179
	20	0.46421		4.83682	3.78395	
			86			178
	30	0.46335		4.83768	3.78573	
			86			177
	40	0.46249		4.83854	3.78750	
			86			178
	50	0.46163		4.83940	3.78928	
			86			177
21	0	0.46077		4.84026	3.79105	
			85			177
	10	0.45992		4.84111	3.79282	
			85			176
	20	0.45907		4.84196	3.79458	
			85			176
	30	0.45822		4.84281	3.79634	
			85			175
	40	0.45737		4.84366	3.79809	
			85			176
	50	0.45652		4.84451	3.79985	
			85			174
22	0	0.45567		4.84536	3.80159	
			84			175
	10	0.45483		4.84620	3.80334	
			84			174
	20	0.45399		4.84704	3.80508	
			84			174
	30	0.45315		4.84788	3.80682	
			84			173
	40	0.45231		4.84872	3.80855	
			84			173
	50	0.45147		4.84956	3.81028	
			83			173
23	0	0.45064		4.85039	3.81201	
			83			172
	10	0.44981		4.85122	3.81373	
			83			172
	20	0.44898		4.85205	3.81545	
			83			172
	30	0.44815		4.85288	3.81717	
			83			171
	40	0.44732		4.85371	3.81888	
			83			171
	50	0.44649		4.85454	3.82059	
			82			171

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
24	0	0. 44567	82	4. 85536	3. 82230	170
	10	0. 44485	82	4. 85618	3. 82400	170
	20	0. 44403	82	4. 85700	3. 82570	169
	30	0. 44321	82	4. 85782	3. 82739	169
	40	0. 44239	81	4. 85864	3. 82908	169
	50	0. 44158		4. 85945	3. 83077	
			81			169
25	0	0. 44077	81	4. 86026	3. 83246	168
	10	0. 43996	81	4. 86107	3. 83414	168
	20	0. 43915	81	4. 86188	3. 83582	167
	30	0. 43834	81	4. 86269	3. 83749	168
	40	0. 43753	80	4. 86350	3. 83917	166
	50	0. 43673		4. 86430	3. 84083	
			80			167
26	0	0. 43593	80	4. 86510	3. 84250	166
	10	0. 43513	80	4. 86590	3. 84416	166
	20	0. 43433	80	4. 86670	3. 84582	166
	30	0. 43353	80	4. 86750	3. 84748	165
	40	0. 43273	80	4. 86830	3. 84913	165
	50	0. 43193		4. 86910	3. 85078	
			79			164
27	0	0. 43114	79	4. 86989	3. 85242	164
	10	0. 43035	79	4. 87068	3. 85406	164
	20	0. 42956	79	4. 87147	3. 85570	164
	30	0. 42877	78	4. 87226	3. 85734	163
	40	0. 42799	78	4. 87304	3. 85897	163
	50	0. 42721		4. 87382	3. 86060	
			78			163
28	0	0. 42643	78	4. 87460	3. 86223	162
	10	0. 42565	78	4. 87538	3. 86385	162
	20	0. 42487	78	4. 87616	3. 86547	162
	30	0. 42409	78	4. 87694	3. 86709	161
	40	0. 42331	78	4. 87772	3. 86870	161
	50	0. 42253		4. 87850	3. 87031	
			77			161
29	0	0. 42176	77	4. 87927	3. 87192	160
	10	0. 42099	77	4. 88004	3. 87352	161
	20	0. 42022	77	4. 88081	3. 87513	159
	30	0. 41945	77	4. 88158	2. 87672	160
	40	0. 41868	76	4. 88235	3. 87832	159
	50	0. 41792		4. 88311	3. 87991	
			76			159

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
30	0	0. 41716		4. 88387	3. 88150	
	10	0. 41640	76	4. 88463	3. 88309	159
	20	0. 41564	76	4. 88539	3. 88467	158
	30	0. 41488	76	4. 88615	3. 88625	158
	40	0. 41412	76	4. 88691	3. 88783	158
	50	0. 41336	76	4. 88767	3. 88940	157
			75			157
31	0	0. 41261		4. 88842	3. 89097	
	10	0. 41186	75	4. 88917	3. 89254	157
	20	0. 41111	75	4. 88992	3. 89411	157
	30	0. 41036	75	4. 89067	3. 89567	156
	40	0. 40961	75	4. 89142	3. 89723	156
	50	0. 40886	75	4. 89217	3. 89879	156
			74			155
32	0	0. 40812		4. 89291	3. 90034	
	10	0. 40738	74	4. 89365	3. 90189	155
	20	0. 40664	74	4. 89439	3. 90344	155
	30	0. 40590	74	4. 89513	4. 90498	154
	40	0. 40516	74	4. 89587	3. 90653	155
	50	0. 40442	74	4. 89661	3. 90807	154
			74			153
33	0	0. 40368		4. 89735	3. 90960	
	10	0. 40295	73	4. 89808	3. 91114	154
	20	0. 40222	73	4. 89881	3. 91267	153
	30	0. 40149	73	4. 89954	3. 91420	153
	40	0. 40076	73	4. 90027	3. 91572	152
	50	0. 40003	73	4. 90100	3. 91724	152
			73			152
34	0	0. 39930		4. 90173	3. 91876	
	10	0. 39857	73	4. 90246	3. 92028	152
	20	0. 39785	72	4. 90318	3. 92179	151
	30	0. 39713	72	4. 90390	3. 92331	152
	40	0. 39641	72	4. 90462	3. 92482	151
	50	0. 39569	72	4. 90534	3. 92632	150
			72			150
35	0	0. 39497		4. 90606	3. 92782	
	10	0. 39425	72	4. 90678	3. 92932	150
	20	0. 39353	72	4. 90750	3. 93082	150
	30	0. 39282	71	4. 90821	3. 93232	150
	40	0. 39211	71	4. 90892	3. 93381	149
	50	0. 39140	71	4. 90963	3. 93530	149
			71			149

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
36	0	0. 39069	71	4. 91034	3. 93679	148
	10	0. 38998	71	4. 91105	3. 93827	148
	20	0. 38927	71	4. 91176	3. 93975	148
	30	0. 38856	70	4. 91247	3. 94123	148
	40	0. 38786	70	4. 91317	3. 94271	147
	50	0. 38716	70	4. 91387	3. 94418	148
37	0	0. 38646	70	4. 91457	3. 94566	146
	10	0. 38576	70	4. 91527	3. 94712	147
	20	0. 38506	70	4. 91597	3. 94859	146
	30	0. 38436	70	4. 91667	3. 95005	146
	40	0. 38366	70	4. 91737	3. 95151	146
	50	0. 38296	69	4. 91807	3. 95297	146
38	0	0. 38227	69	4. 91876	3. 95443	145
	10	0. 38158	69	4. 91945	3. 95588	145
	20	0. 38089	69	4. 92014	3. 95733	145
	30	0. 38020	69	4. 92083	3. 95878	145
	40	0. 37951	69	4. 92152	3. 96023	144
	50	0. 37882	69	4. 92221	3. 96167	144
39	0	0. 37813	68	4. 92290	3. 96311	144
	10	0. 37745	68	4. 92358	3. 96455	144
	20	0. 37677	68	4. 92426	3. 96599	143
	30	0. 37609	68	4. 92494	3. 96742	143
	40	0. 37541	68	4. 92562	3. 96885	143
	50	0. 37473	68	4. 92630	3. 97028	142
40	0	0. 37405	68	4. 92698	3. 97170	143
	10	0. 37337	68	4. 92766	3. 97313	142
	20	0. 37269	67	4. 92834	3. 97455	142
	30	0. 37202	67	4. 92901	3. 97597	141
	40	0. 37135	67	4. 92968	3. 97738	142
	50	0. 37068	67	4. 93035	3. 97880	141
41	0	0. 37001	67	4. 93102	3. 97021	141
	10	0. 36934	67	4. 93169	3. 98162	140
	20	0. 36867	67	4. 93236	3. 98302	141
	30	0. 36800	66	4. 93303	3. 98443	140
	40	0. 36734	66	4. 93369	3. 98583	140
	50	0. 36668	66	4. 93435	3. 98723	139

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
42	0	0. 36602		4. 93501	3. 98862	
	10	0. 36536	66	4. 93567	3. 99002	140
	20	0. 36470	66	4. 93633	3. 99141	139
	30	0. 36404	66	4. 93699	3. 99280	139
	40	0. 36338	66	4. 93765	3. 99419	139
	50	0. 36272		4. 93831	3. 99557	138
			66			139
43	0	0. 36206		4. 93897	3. 99696	
	10	0. 36141	65	4. 93962	3. 99834	138
	20	0. 36076	65	4. 94027	3. 99972	138
	30	0. 36011	65	4. 94092	4. 00109	137
	40	0. 35946	65	4. 94157	4. 00247	138
	50	0. 35881	65	4. 94222	4. 00384	137
						137
44	0	0. 35816		4. 94287	4. 00521	
	10	0. 35751	65	4. 94352	4. 00657	136
	20	0. 35686	65	4. 94417	4. 00793	136
	30	0. 35622	64	4. 94481	4. 00930	137
	40	0. 35558	64	4. 94545	4. 01066	136
	50	0. 35494	64	4. 94609	4. 01202	136
			64			135
45	0	0. 35430		4. 94673	4. 01337	
	10	0. 35366	64	4. 94737	4. 01473	136
	20	0. 35302	64	4. 94801	4. 01608	135
	30	0. 35238	64	4. 94865	4. 01743	135
	40	0. 35174	64	4. 94929	4. 01877	134
	50	0. 35110	64	4. 94993	4. 02012	135
			63			134
46	0	0. 35047		4. 95056	4. 02146	
	10	0. 34984	63	4. 95119	4. 02280	134
	20	0. 34921	63	4. 95182	4. 02414	134
	30	0. 34858	63	4. 95245	4. 02547	133
	40	0. 34795	63	4. 95308	4. 02681	134
	50	0. 34732	63	4. 95371	4. 02814	133
			63			133
47	0	0. 34669		4. 95434	4. 02947	
	10	0. 34606	63	4. 95497	4. 03080	133
	20	0. 34544	62	4. 95559	4. 03212	132
	30	0. 34482	62	4. 95621	4. 03344	132
	40	0. 34420	62	4. 95683	4. 03477	133
	50	0. 34358	62	4. 95745	4. 03608	131
			62			132

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
48	0	0. 34296		4. 95807	4. 03740	
	10	0. 34234	62	4. 95869	4. 03871	131
	20	0. 34172	62	4. 95931	4. 04003	132
	30	0. 34110	62	4. 95993	4. 04134	131
	40	0. 34048	62	4. 96055	4. 04265	131
	50	0. 33986	62	4. 96117	4. 04395	130
			61			131
49	0	0. 33925		4. 96178	4. 04526	
	10	0. 33864	61	4. 96239	4. 04656	130
	20	0. 33803	61	4. 96300	4. 04786	130
	30	0. 33742	61	4. 96361	4. 04916	130
	40	0. 33681	61	4. 96422	4. 05045	129
	50	0. 33620	61	4. 96483	4. 05175	130
			61			129
50	0	0. 33559		4. 96544	4. 05304	
	10	0. 33498	61	4. 96605	4. 05433	129
	20	0. 33438	60	4. 96665	4. 05561	128
	30	0. 33378	60	4. 96725	4. 05690	129
	40	0. 33318	60	4. 96785	4. 05818	128
	50	0. 33258	60	4. 96845	4. 05946	128
			61			128
51	0	0. 33197		4. 96906	4. 06074	
	10	0. 33137	60	4. 96965	4. 06202	128
	20	0. 33077	60	4. 97026	4. 06330	128
	30	0. 33017	60	4. 97086	4. 06457	127
	40	0. 32958	59	4. 97145	4. 06584	127
	50	0. 32899	59	4. 97204	4. 06711	127
			60			127
52	0	0. 32839		4. 97264	4. 06838	
	10	0. 32780	59	4. 97323	4. 06965	127
	20	0. 32720	60	4. 97383	4. 07091	126
	30	0. 32661	59	4. 97442	4. 07217	126
	40	0. 32602	59	4. 97501	4. 07343	126
	50	0. 32543	59	4. 97560	4. 07469	126
			58			126
53	0	0. 32485		4. 97618	4. 07595	
	10	0. 32426	59	4. 97677	4. 07720	125
	20	0. 32367	59	4. 97736	4. 07845	125
	30	0. 32309	58	4. 97794	4. 07970	125
	40	0. 32250	59	4. 97853	4. 08095	125
	50	0. 32192	58	4. 97911	4. 08220	125
			58			124

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
54	0	0. 32134		4. 97969	4. 08344	
	10	0. 32076	58	4. 98027	4. 08468	124
	20	0. 32018	58	4. 98085	4. 08592	124
	30	0. 31960	58	4. 98143	4. 08716	124
	40	0. 31902	58	4. 98201	4. 08840	124
	50	0. 31844	58	4. 98259	4. 08964	124
			57			123
55	0	0. 31787		4. 98316	4. 09087	
	10	0. 31729	58	4. 98374	4. 09210	123
	20	0. 31672	57	4. 98431	4. 09333	123
	30	0. 31614	58	4. 98489	4. 09456	123
	40	0. 31557	57	4. 98546	4. 09578	122
	50	0. 31500	57	4. 98603	4. 09701	123
			57			122
56	0	0. 31443		4. 98660	4. 09823	
	10	0. 31386	57	4. 98717	4. 09945	122
	20	0. 31329	57	4. 98774	4. 10067	122
	30	0. 31272	57	4. 98831	4. 10188	121
	40	0. 31216	56	4. 98887	4. 10310	122
	50	0. 31159	57	4. 98944	4. 10431	121
			56			121
57	0	0. 31103		4. 99000	4. 10552	
	10	0. 31046	57	4. 99057	4. 10673	121
	20	0. 30990	56	4. 99113	4. 10794	121
	30	0. 30934	56	4. 99169	4. 10915	121
	40	0. 30878	56	4. 99225	4. 11035	120
	50	0. 30822	56	4. 99281	4. 11155	120
			56			120
58	0	0. 30766		4. 99337	4. 11275	
	10	0. 30710	56	4. 99393	4. 11395	120
	20	0. 30655	55	4. 99448	4. 11515	120
	30	0. 30599	56	4. 99504	4. 11634	119
	40	0. 30544	55	4. 99559	4. 11754	120
	50	0. 30488	56	4. 99615	4. 11873	119
			55			119
59	0	0. 30433		4. 99670	4. 11992	
	10	0. 30378	55	4. 99725	4. 12111	119
	20	0. 30323	55	4. 99780	4. 12229	118
	30	0. 30268	55	4. 99835	4. 12348	119
	40	0. 30213	55	4. 99890	4. 12466	118
	50	0. 30158	55	4. 99945	4. 12584	118
			55			118

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
0	0	0.30103		5.00000	4.12702	
	10	0.30048	55	5.00055	4.12820	118
	20	0.29994	54	5.00109	4.12938	118
	30	0.29939	55	5.00164	4.13055	117
	40	0.29885	54	5.00218	4.13172	117
	50	0.29831	54	5.00272	4.13289	117
			55			117
1	0	0.29776		5.00327	4.13406	
	10	0.29722	54	5.00381	4.13523	117
	20	0.29668	54	5.00435	4.13640	117
	30	0.29614	54	5.00489	4.13756	116
	40	0.29560	54	5.00543	4.13872	116
	50	0.29507	53	5.00596	4.13988	116
			54			116
2	0	0.29453		5.00650	4.14104	
	10	0.29399	54	5.00704	4.14220	116
	20	0.29346	53	5.00757	4.14336	116
	30	0.29293	53	5.00810	4.14451	115
	40	0.29239	54	5.00864	4.14566	115
	50	0.29186	53	5.00917	4.14682	116
			53			115
3	0	0.29133		5.00970	4.14797	
	10	0.29080	53	5.01023	4.14911	114
	20	0.29027	53	5.01076	4.15026	115
	30	0.28974	53	5.01129	4.15140	114
	40	0.28921	53	5.01182	4.15255	115
	50	0.28869	52	5.01234	4.15369	114
			53			114
4	0	0.28816		5.01287	4.15483	
	10	0.28764	52	5.01339	4.15597	114
	20	0.28711	53	5.01392	3.15710	113
	30	0.28659	52	5.01444	4.15824	114
	40	0.28607	52	5.01496	4.15937	113
	50	0.28554	53	5.01549	4.16050	113
			52			113
5	0	0.28502		5.01601	4.16163	
	10	0.28450	52	5.01653	4.16276	113
	20	0.28398	52	5.01705	4.26389	113
	30	0.28346	52	5.01757	4.16501	112
	40	0.28295	51	5.01808	4.16614	113
	50	0.28243	52	5.01860	4.16726	112
			52			112

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
6	0	0. 28191		5. 01912	4. 16838	
	10	0. 28140	51	5. 01963	4. 16950	112
	20	0. 28089	51	5. 02014	4. 17062	112
	30	0. 28037	52	5. 02066	4. 17173	111
	40	0. 27986	51	5. 02117	4. 17285	112
	50	0. 27935	51	5. 02168	4. 17396	111
7	0	0. 27884		5. 02219	4. 17507	111
	10	0. 27833	51	5. 02270	4. 17618	111
	20	0. 27782	51	5. 02321	4. 17729	111
	30	0. 27731	51	5. 02372	4. 17839	110
	40	0. 27680	51	5. 02423	4. 17950	111
	50	0. 27630	50	5. 02473	4. 18060	110
8	0	0. 27579	51	5. 02524	4. 18171	111
	10	0. 27529	50	5. 02574	4. 18281	110
	20	0. 27478	51	5. 02625	4. 18391	110
	30	0. 27428	50	5. 02675	4. 18500	109
	40	0. 27378	50	5. 02725	4. 18610	110
	50	0. 27327	51	5. 02776	4. 18719	109
9	0	0. 27277	50	5. 02826	4. 18828	109
	10	0. 27227	50	5. 02876	4. 18938	110
	20	0. 27177	50	5. 02926	4. 19047	109
	30	0. 27127	50	5. 02976	4. 19156	109
	40	0. 27077	50	5. 03026	4. 19265	109
	50	0. 27028	49	5. 03075	4. 19373	108
10	0	0. 26978	50	5. 03125	4. 19482	109
	10	0. 26929	49	5. 03174	4. 19590	108
	20	0. 26879	50	5. 03224	4. 19698	108
	30	0. 26830	49	5. 03275	4. 19806	108
	40	0. 26781	49	5. 03322	4. 19914	108
	50	0. 26731	50	5. 03372	4. 20021	107
11	0	0. 26682	49	5. 03421	4. 20129	108
	10	0. 26633	49	5. 03470	4. 20236	107
	20	0. 26584	49	5. 03519	4. 20344	108
	30	0. 26535	49	5. 03568	4. 20451	107
	40	0. 26486	49	5. 03617	4. 20558	107
	50	0. 26438	48	5. 03665	4. 20665	107
			48			106

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
12	0	0. 26389		5. 03714	4. 20771	
	10	0. 26340	49	5. 03763	4. 20878	107
	20	0. 26292	48	5. 03811	4. 20984	106
	30	0. 26244	48	5. 03859	4. 21091	107
	40	0. 26195	49	5. 03908	4. 21197	106
	50	0. 26147	48	5. 03956	4. 21303	106
			48			
13	0	0. 26099		5. 04004	4. 21409	106
	10	0. 26051	48	5. 04052	4. 21514	105
	20	0. 26003	48	5. 04100	4. 21620	106
	30	0. 25955	48	5. 04148	4. 21725	105
	40	0. 25907	48	5. 04196	4. 21831	106
	50	0. 25859	48	5. 04244	4. 21936	105
			48			
14	0	0. 25811		5. 04292	4. 22041	105
	10	0. 25763	48	5. 04340	4. 22146	104
	20	0. 25716	47	5. 04387	4. 22250	105
	30	0. 25668	48	5. 04435	4. 22355	104
	40	0. 25621	47	5. 04482	4. 22459	105
	50	0. 25573	48	5. 04530	4. 22564	104
			47			
15	0	0. 25526		5. 04577	4. 22668	104
	10	0. 25479	47	5. 04624	4. 22772	104
	20	0. 25432	47	5. 04671	4. 22876	104
	30	0. 25385	47	5. 04718	4. 22980	103
	40	0. 25338	47	5. 04765	4. 23083	104
	50	0. 25291	47	5. 04812	4. 23187	103
			47			
16	0	0. 25244		5. 04859	4. 23290	103
	10	0. 25197	47	5. 04906	4. 23393	103
	20	0. 25150	47	5. 04953	4. 23496	103
	30	0. 25104	46	5. 04999	4. 23599	103
	40	0. 25057	47	5. 05046	4. 23702	103
	50	0. 25011	46	5. 05092	4. 23805	102
			47			
17	0	0. 24964		5. 05139	4. 23907	103
	10	0. 24918	46	5. 05185	4. 24010	102
	20	0. 24872	46	5. 05231	4. 24112	102
	30	0. 24825	47	5. 05278	4. 24214	102
	40	0. 24779	46	5. 05324	4. 24316	102
	50	0. 24733	46	5. 05370	4. 24418	102
			46			

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
18	0	0. 24687		5. 05416	4. 24520	
	10	0. 24641	46	5. 05462	4. 24622	102
	20	0. 24595	46	5. 05508	4. 24723	101
	30	0. 24550	45	5. 05553	4. 24825	102
	40	0. 24504	46	5. 05599	4. 24926	101
	50	0. 24458	46	5. 05645	4. 25027	101
			45			101
19	0	0. 24413		5. 05690	4. 25128	
	10	0. 24367	46	5. 05736	4. 25229	101
	20	0. 24322	45	5. 05781	4. 25330	101
	30	0. 24276	46	5. 05827	4. 25430	100
	40	0. 24231	45	5. 05872	4. 25531	101
	50	0. 24186	45	5. 05917	4. 25631	100
			45			100
20	0	0. 24141		5. 05962	4. 25731	
	10	0. 24096	45	5. 06007	4. 25831	100
	20	0. 24051	45	5. 06052	4. 25931	100
	30	0. 24006	45	5. 06097	4. 26031	100
	40	0. 23961	45	5. 06142	4. 26131	100
	50	0. 23916	45	5. 06187	4. 26231	100
			45			99
21	0	0. 23871		5. 06232	4. 26330	
	10	0. 23827	44	5. 06276	4. 26429	99
	20	0. 23782	45	5. 06321	4. 26529	100
	30	0. 23738	44	5. 06365	4. 26628	99
	40	0. 23693	45	5. 06410	4. 26727	99
	50	0. 23649	44	5. 06454	4. 26826	99
			44			98
22	0	0. 23605		5. 06498	4. 26924	
	10	0. 23560	45	5. 06543	4. 27023	99
	20	0. 23516	44	5. 06587	4. 27121	98
	30	0. 23472	44	5. 06631	4. 27220	99
	40	0. 23428	44	5. 06675	4. 27318	98
	50	0. 23384	44	5. 06719	4. 27416	98
			44			98
23	0	0. 23340		5. 06763	4. 27514	
	10	0. 23296	44	5. 06807	4. 27612	98
	20	0. 23252	44	5. 06851	4. 27710	98
	30	0. 23209	43	5. 06894	4. 27807	97
	40	0. 23165	44	5. 06938	4. 27905	98
	50	0. 23122	43	5. 06981	4. 28002	97
			44			97

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
24	0	0. 23078		5. 07025	4. 28099	
			43			98
	10	0. 23035		5. 07068	4. 28197	
			44			97
	20	0. 22991		5. 07112	4. 28294	
			43			97
	30	0. 22948		5. 07155	4. 28391	
			43			96
	40	0. 22905		5. 07198	4. 28487	
			43			97
	50	0. 22862		5. 07241	4. 28584	
			43			97
25	0	0. 22819		5. 07284	4. 28681	
			44			98
	10	0. 22775		5. 07328	4. 28777	
			43			98
	20	0. 22732		5. 07371	4. 28873	
			42			96
	30	0. 22690		5. 07413	4. 28969	
			43			96
	40	0. 22647		5. 07456	4. 29065	
			43			97
	50	0. 22604		5. 07499	4. 29162	
			43			95
26	0	0. 22561		5. 07542	4. 29257	
			42			96
	10	0. 22519		5. 07584	4. 29353	
			43			96
	20	0. 22476		5. 07627	4. 29449	
			43			95
	30	0. 22433		5. 07670	4. 29544	
			42			95
	40	0. 22391		5. 07712	4. 29639	
			42			96
	50	0. 22349		5. 07754	4. 29735	
			43			95
27	0	0. 22306		5. 07797	4. 29830	
			42			95
	10	0. 22264		5. 07839	4. 29925	
			42			95
	20	0. 22222		5. 07881	4. 30020	
			42			95
	30	0. 22180		5. 07923	4. 30115	
			42			94
	40	0. 22138		5. 07965	4. 30209	
			42			95
	50	0. 22096		5. 08007	4. 30304	
			42			94
28	0	0. 22054		5. 08049	4. 30398	
			42			95
	10	0. 22012		5. 08091	4. 30493	
			42			94
	20	0. 21970		5. 08133	4. 30587	
			42			94
	30	0. 21928		5. 08175	4. 30681	
			41			94
	40	0. 21887		5. 08216	4. 30775	
			42			94
	50	0. 21845		5. 08258	4. 30869	
			42			94
29	0	0. 21803		5. 08300	4. 30963	
			41			93
	10	0. 21762		5. 08341	4. 31056	
			42			94
	20	0. 21720		5. 08383	4. 31150	
			41			93
	30	0. 21679		5. 08424	4. 31243	
			41			94
	40	0. 21638		5. 08465	4. 31337	
			42			93
	50	0. 21596		5. 08507	4. 31430	
			41			93

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
30	0	0.21555		5.08548	4.31523	
	10	0.21514	41	5.08589	4.31616	93
	20	0.21473	41	5.08630	4.31709	93
	30	0.21432	41	5.08671	4.31801	92
	40	0.21391	41	5.08712	4.31894	93
	50	0.21350	41	5.08753	4.31987	93
						92
31	0	0.21309	40	5.08794	4.32079	
	10	0.21269	41	5.08834	4.32171	92
	20	0.21228	41	5.08875	4.32264	93
	30	0.21187	40	5.08916	4.32356	92
	40	0.21147	41	5.08956	4.32448	92
	50	0.21106	40	5.08997	4.32540	92
						91
32	0	0.21066	41	5.09037	4.32631	
	10	0.21025	40	5.09078	4.32723	92
	20	0.20985	40	5.09118	4.32815	92
	30	0.20945	40	5.09158	4.32906	91
	40	0.20905	41	5.09198	4.32997	91
	50	0.20864	40	5.09239	4.33089	92
						91
33	0	0.20824	40	5.09279	4.33180	
	10	0.20784	40	5.09319	4.33271	91
	20	0.20744	40	5.09359	4.33362	91
	30	0.20704	39	5.09399	4.33453	91
	40	0.20665	40	5.09438	4.33543	90
	50	0.20625	40	5.09478	4.33634	91
						90
34	0	0.20585	40	5.09518	4.33724	
	10	0.20545	39	5.09558	4.33815	91
	20	0.20506	40	5.09597	4.33905	90
	30	0.20466	39	5.09637	4.33995	90
	40	0.20427	40	5.09676	4.34085	90
	50	0.20387	39	5.09716	4.34175	90
						90
35	0	0.20348	39	5.09755	4.34265	
	10	0.20309	40	5.09794	4.34355	90
	20	0.20269	39	5.09834	4.34444	89
	30	0.20230	39	5.09873	4.34534	90
	40	0.20191	39	5.09912	4.34623	89
	50	0.20152	39	5.09951	4.34713	90
						89

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
36	0	0. 20113		5. 09990	4. 34802	
	10	0. 20074	39	5. 10029	4. 34891	89
	20	0. 20035	39	5. 10068	4. 34980	89
	30	0. 19996	39	5. 10107	4. 35069	89
	40	0. 19957	39	5. 10146	4. 35158	89
	50	0. 19919	38	5. 10184	4. 35247	89
			39			88
37	0	0. 19880		5. 10223	4. 35335	
	10	0. 19841	39	5. 10262	4. 35424	89
	20	0. 19803	38	5. 10300	4. 35512	88
	30	0. 19764	39	5. 10339	4. 35601	89
	40	0. 19726	38	5. 10377	4. 35689	88
	50	0. 19687	39	5. 10415	4. 35777	88
			38			88
38	0	0. 19649		5. 10454	4. 35865	
	10	0. 19611	38	5. 10492	4. 35953	88
	20	0. 19572	39	5. 10531	4. 36041	88
	30	0. 19534	38	5. 10569	4. 36128	87
	40	0. 19496	38	5. 10607	4. 36216	88
	50	0. 19458	38	5. 10645	4. 36303	87
			38			88
39	0	0. 19420		5. 10683	4. 36391	
	10	0. 19382	38	5. 10721	4. 36478	87
	20	0. 19344	38	5. 10759	4. 36565	87
	30	0. 19306	38	5. 10797	4. 36653	88
	40	0. 19269	37	5. 10834	4. 36740	87
	50	0. 19231	38	5. 10872	4. 36827	87
			38			86
40	0	0. 19193		5. 10910	4. 36913	
	10	0. 19156	37	5. 10947	4. 37000	87
	20	0. 19118	38	5. 10985	4. 37087	87
	30	0. 19081	37	5. 11022	4. 37173	86
	40	0. 19043	38	5. 11060	4. 37260	87
	50	0. 19006	37	5. 11097	4. 37346	86
			38			86
41	0	0. 18968		5. 11135	4. 37432	
	10	0. 18931	37	5. 11172	4. 37518	86
	20	0. 18894	37	5. 11209	4. 37604	86
	30	0. 18857	37	5. 11246	4. 37690	86
	40	0. 18820	37	5. 11283	4. 37776	86
	50	0. 18783	37	5. 11320	4. 37862	86
			37			86

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
42	0	0. 18746		5. 11357	4. 37948	
	10	0. 18709	37	5. 11394	4. 38033	85
	20	0. 18672	37	5. 11431	4. 38119	86
	30	0. 18635	37	5. 11468	4. 38204	85
	40	0. 18598	37	5. 11505	4. 38289	85
	50	0. 18561	37	5. 11542	4. 38374	85
			36			85
43	0	0. 18525		5. 11578	4. 38459	
	10	0. 18488	37	5. 11615	4. 38544	85
	20	0. 18451	37	5. 11652	4. 38629	85
	30	0. 18415	36	5. 11688	4. 38714	85
	40	0. 18378	37	5. 11725	4. 38799	85
	50	0. 18342	36	5. 11761	4. 38884	85
			36			84
44	0	0. 18306		5. 11797	4. 38968	
	10	0. 18269	37	5. 11834	4. 39052	84
	20	0. 18233	36	5. 11870	4. 39137	85
	30	0. 18197	36	5. 11906	4. 39221	84
	40	0. 18161	36	5. 11942	4. 39305	84
	50	0. 18124	37	5. 11979	4. 39389	84
			35			84
45	0	0. 18089		5. 12014	4. 39473	
	10	0. 18053	36	5. 12050	4. 39557	84
	20	0. 18017	36	5. 12086	4. 39641	84
	30	0. 17981	36	5. 12122	4. 39725	84
	40	0. 17945	36	5. 12158	4. 39808	83
	50	0. 17909	36	5. 12194	4. 39892	84
			35			83
46	0	0. 17874		5. 12229	4. 39975	
	10	0. 17838	36	5. 12265	4. 40058	83
	20	0. 17802	36	5. 12301	4. 40142	84
	30	0. 17767	35	5. 12336	4. 40225	83
	40	0. 17731	36	5. 12372	4. 40308	83
	50	0. 17696	35	5. 12407	4. 40391	83
			36			83
47	0	0. 17660		5. 12443	4. 40474	
	10	0. 17625	35	5. 12478	4. 40556	82
	20	0. 17590	35	5. 12513	4. 40639	83
	30	0. 17554	36	5. 12549	4. 40722	83
	40	0. 17519	35	5. 12584	4. 40804	82
	50	0. 17484	35	5. 12619	4. 40886	82
			35			83

M.	S.	Log. ½ elap. Time.	Com. Diff.	Mid. Log. Time.	Log. Rising.	Difference
48	0	0. 17449		5. 12654	4. 40969	
	10	0. 17414	35	5. 12689	4. 41051	82
	20	0. 17379	35	5. 12724	4. 41133	82
	30	0. 17344	35	5. 12759	4. 41215	82
	40	0. 17309	35	5. 12794	4. 41297	82
	50	0. 17274	35	5. 12829	4. 41379	82
49	0	0. 17239		5. 12864	4. 41461	
	10	0. 17205	34	5. 12898	4. 41542	81
	20	0. 17170	35	5. 12933	4. 41624	82
	30	0. 17135	35	5. 12968	4. 41706	82
	40	0. 17101	34	5. 13002	4. 41787	81
	50	0. 17066	35	5. 13037	4. 41868	81
50	0	0. 17032	34	5. 13071	4. 41950	82
	10	0. 16997	35	5. 13106	4. 42031	81
	20	0. 16963	34	5. 13140	4. 42112	81
	30	0. 16928	35	5. 13175	4. 42193	81
	40	0. 16894	34	5. 13209	4. 42274	81
	50	0. 16860	34	5. 13243	4. 42355	81
51	0	0. 16826	34	5. 13277	4. 42435	80
	10	0. 16792	34	5. 13311	4. 42516	81
	20	0. 16758	34	5. 13345	4. 42597	81
	30	0. 16724	34	5. 13379	4. 42677	80
	40	0. 16690	34	5. 13413	4. 42758	81
	50	0. 16656	34	5. 13447	4. 42838	80
52	0	0. 16622	34	5. 13481	4. 42918	80
	10	0. 16588	34	5. 13515	4. 42998	80
	20	0. 16554	34	5. 13549	4. 43078	80
	30	0. 16520	33	5. 13583	4. 43158	80
	40	0. 16487	34	5. 13616	4. 43238	80
	50	0. 16453	34	5. 13650	4. 43318	80
53	0	0. 16419	33	5. 13684	4. 43398	79
	10	0. 16386	34	5. 13717	4. 43477	80
	20	0. 16352	33	5. 13751	4. 43557	79
	30	0. 16319	34	5. 13784	4. 43636	80
	40	0. 16285	33	5. 13818	4. 43716	79
	50	0. 16252	33	5. 13851	4. 43795	79

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
54	0	0. 16219		5. 13884	4. 43874	
	10	0. 16186	33	5. 13917	4. 43953	79
	20	0. 16152	34	5. 13951	4. 44032	79
	30	0. 16119	33	5. 13984	4. 44111	79
	40	0. 16086	33	5. 14017	4. 44190	79
	50	0. 16053	33	5. 14050	4. 44269	79
55	0	0. 16020		5. 14083	4. 44348	
	10	0. 15987	33	5. 14116	4. 44426	78
	20	0. 15954	33	5. 14149	4. 44505	79
	30	0. 15921	33	5. 14182	4. 44583	78
	40	0. 15888	33	5. 14215	4. 44662	79
	50	0. 15856	32	5. 14247	4. 44740	78
56	0	0. 15823	33	5. 14280	4. 44818	78
	10	0. 15790	33	5. 14313	4. 44896	78
	20	0. 15758	32	5. 14345	4. 44974	78
	30	0. 15725	33	5. 14378	4. 45052	78
	40	0. 15692	33	5. 14411	4. 45130	78
	50	0. 15660	32	5. 14443	4. 45208	78
57	0	0. 15628	32	5. 14475	4. 45286	
	10	0. 15595	33	5. 14508	4. 45363	77
	20	0. 15563	32	5. 14540	4. 45441	78
	30	0. 15530	33	5. 14573	4. 45518	77
	40	0. 15498	32	5. 14605	4. 45596	78
	50	0. 15466	32	5. 14637	4. 45673	77
58	0	0. 15434	32	5. 14669	4. 45750	77
	10	0. 15402	32	5. 14701	4. 45827	77
	20	0. 15370	32	5. 14733	4. 45904	77
	30	0. 15338	32	5. 14765	4. 45981	77
	40	0. 15306	32	5. 14797	4. 46058	77
	50	0. 15274	32	5. 14829	4. 46135	77
59	0	0. 15242	32	5. 14861	4. 46212	77
	10	0. 15210	32	5. 14893	4. 46289	76
	20	0. 15178	32	5. 14925	4. 46365	77
	30	0. 15146	31	5. 14957	4. 46442	76
	40	0. 15115	32	5. 14988	4. 46518	77
	50	0. 15083	32	5. 15020	4. 46595	76

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
0	0	0. 15051		5. 15052	4. 46671	
	10	0. 15020	31	5. 15083	4. 46747	76
	20	0. 14988	32	5. 15115	4. 46823	76
	30	0. 14957	31	5. 15146	4. 46899	76
	40	0. 14926	31	5. 15177	4. 46975	76
	50	0. 14894	32	5. 15209	4. 47051	76
			31			76
1	0	0. 14863		5. 15240	4. 47127	
	10	0. 14832	31	5. 15271	4. 47203	76
	20	0. 14800	32	5. 15303	4. 47278	75
	30	0. 14769	31	5. 15334	4. 47354	76
	40	0. 14738	31	5. 15365	4. 47430	76
	50	0. 14707	31	5. 15396	4. 47505	75
			31			75
2	0	0. 14676		5. 15427	4. 47580	
	10	0. 14645	31	5. 15458	4. 47656	76
	20	0. 14614	31	5. 15489	4. 47731	75
	30	0. 14583	31	5. 15520	4. 47806	75
	40	0. 14552	31	5. 15551	4. 47881	75
	50	0. 14521	31	5. 15582	4. 47956	75
			31			75
3	0	0. 14490		5. 15613	4. 48031	
	10	0. 14460	30	5. 15643	4. 48106	75
	20	0. 14429	31	5. 15674	4. 48180	74
	30	0. 14398	31	5. 15705	4. 48255	75
	40	0. 14368	30	5. 15735	4. 48330	75
	50	0. 14337	31	5. 15766	4. 48404	74
			30			75
4	0	0. 14307		5. 15796	4. 48479	
	10	0. 14276	31	5. 15827	4. 48553	74
	20	0. 14246	30	5. 15857	4. 48627	74
	30	0. 14215	31	5. 15888	4. 48701	74
	40	0. 14185	30	5. 15918	4. 48776	75
	50	0. 14155	30	5. 15948	4. 48550	74
			31			74
5	0	0. 14124		5. 15979	4. 48924	
	10	0. 14094	30	5. 16009	4. 48998	74
	20	0. 14064	30	5. 16039	4. 49071	73
	30	0. 14034	30	5. 16069	4. 49145	74
	40	0. 14004	30	5. 16099	4. 49219	74
	50	0. 13974	30	5. 16129	4. 49293	74
			30			73

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
6	0	0. 13944		5. 16159	4. 49366	
	10	0. 13914	30	5. 16189	4. 49440	74
	20	0. 13884	30	5. 16219	4. 49513	73
	30	0. 13854	30	5. 16249	4. 49586	73
	40	0. 13824	30	5. 16279	4. 49659	73
	50	0. 13794		5. 16309	4. 49733	74
			29			73
7	0	0. 13765		5. 16338	4. 49806	
	10	0. 13735	30	5. 16368	4 49879	73
	20	0. 13705	30	5. 16398	4. 49952	73
	30	0. 13676	29	5. 16427	4. 50025	73
	40	0. 13646	30	5. 16457	4. 50098	73
	50	0. 13617	29	5. 16486	4. 50170	72
			30			73
8	0	0. 13587		5. 16516	4. 50243	
	10	0. 13558	29	5. 16545	4. 50316	73
	20	0. 13528	30	5. 16575	4. 50388	72
	30	0. 13499	29	5. 16604	4. 50461	73
	40	0. 13470	29	5. 16633	4. 50533	72
	50	0. 13441	29	5. 16662	4. 50605	72
			30			72
9	0	0. 13411		5. 16692	4. 50677	
	10	0. 13382	29	5. 16721	4. 50750	73
	20	0. 13353	29	5. 16750	4. 50822	72
	30	0. 13324	29	5. 16779	4. 50894	72
	40	0. 13295	29	5. 16808	4. 50966	72
	50	0. 13266	29	5. 16837	4. 51038	72
			29			71
10	0	0. 13237		5. 16866	4. 51109	
	10	0. 13208	29	5. 16895	4. 51181	72
	20	0. 13179	29	5. 16924	4. 51253	72
	30	0. 13150	29	5. 16953	4. 51325	72
	40	0. 13121	29	5. 16982	4. 51396	71
	50	0. 13093	28	5. 17010	4. 51467	71
			29			72
11	0	0. 13064		5. 17039	4. 51539	
	10	0. 13035	29	5. 17068	4. 51610	71
	20	0. 13007	28	5. 17096	4. 51681	71
	30	0. 12978	29	5. 17125	4. 51753	72
	40	0. 12950	28	5. 17153	4. 51824	71
	50	0. 12921	29	5. 17182	4. 51895	71
			28			71

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
12	0	0. 12893		5. 17210	4. 51966	
	10	0. 12864	29	5. 17239	4. 52037	71
	20	0. 12836	28	5. 17267	4. 52107	70
	30	0. 12807	29	5. 17296	4. 52178	71
	40	0. 12779	28	5. 17324	4. 52249	71
	50	0. 12751	28	5. 17352	4. 52319	70
						71
13	0	0. 12723	28	5. 17380	4. 52390	
	10	0. 12695	28	5. 17408	4. 52461	71
	20	0. 12666	29	5. 17437	4. 52531	70
	30	0. 12638	28	5. 17465	4. 52601	70
	40	0. 12610	28	5. 17493	4. 52672	71
	50	0. 12582	28	5. 17521	4. 52742	70
						70
14	0	0. 12554	28	5. 17549	4. 52812	
	10	0. 12526	27	5. 17577	4. 52882	70
	20	0. 12499	28	5. 17604	4. 52952	70
	30	0. 12471	28	5. 17632	4. 53022	70
	40	0. 12443	28	5. 17660	4. 53092	70
	50	0. 12415	28	5. 17688	4. 53162	70
						69
15	0	0. 12387	27	5. 17716	4. 53231	
	10	0. 12360	28	5. 17743	4. 53301	70
	20	0. 12332	27	5. 17771	4. 53371	70
	30	0. 12305	28	5. 17798	4. 53440	69
	40	0. 12277	28	5. 17826	4. 53510	70
	50	0. 12249	27	5. 17854	4. 53579	69
						69
16	0	0. 12222	27	5. 17881	4. 53648	
	10	0. 12195	28	5. 17908	4. 53718	70
	20	0. 12167	27	5. 17936	4. 53787	69
	30	0. 12140	27	5. 17963	4. 53856	69
	40	0. 12113	28	5. 17990	4. 53925	69
	50	0. 12085	27	5. 18018	4. 53994	69
						69
17	0	0. 12058	27	5. 18045	4. 54063	
	10	0. 12031	27	5. 18072	4. 54132	69
	20	0. 12004	27	5. 18099	4. 54201	69
	30	0. 11977	28	5. 18126	4. 54269	68
	40	0. 11949	27	5. 18154	4. 54338	69
	50	0. 11922	27	5. 18181	4. 54407	69
						68

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
18	0	0. 11895		5. 18208	4. 54475	
			27			69
	10	0. 11868		5. 18235	4. 54544	
			26			68
	20	0. 11842		5. 18261	4. 54612	
			27			68
	30	0. 11815		5. 18288	4. 54680	
			27			69
	40	0. 11788		5. 18315	4. 54749	
			27			68
	50	0. 11761		5. 18342	4. 54817	
			27			68
19	0	0. 11734		5. 18369	4. 54885	
			26			68
	10	0. 11708		5. 18395	4. 54953	
			27			68
	20	0. 11681		5. 18422	4. 55021	
			27			68
	30	0. 11654		5. 18449	4. 55089	
			26			68
	40	0. 11628		5. 18475	4. 55157	
			27			68
	50	0. 11601		5. 18502	4. 55225	
			26			68
20	0	0. 11575		5. 18528	4. 55293	
			27			67
	10	0. 11548		5. 18555	4. 55360	
			26			68
	20	0. 11522		5. 18581	4. 55428	
			27			68
	30	0. 11495		5. 18608	4. 55496	
			26			67
	40	0. 11469		5. 18634	4. 55563	
			26			67
	50	0. 11443		5. 18660	4. 55630	
			27			68
21	0	0. 11416		5. 18687	4. 55698	
			26			67
	10	0. 11390		5. 18713	4. 55765	
			26			67
	20	0. 11364		5. 18739	4. 55832	
			26			68
	30	0. 11338		5. 18765	4. 55900	
			26			67
	40	0. 11312		5. 18791	4. 55967	
			27			67
	50	0. 11285		5. 18818	4. 56034	
			26			67
22	0	0. 11259		5. 18844	4. 56101	
			26			67
	10	0. 11233		5. 18870	4. 56168	
			26			67
	20	0. 11207		5. 18896	4. 56235	
			26			66
	30	0. 11181		5. 18922	4. 56301	
			26			67
	40	0. 11155		5. 18948	4. 56368	
			25			67
	50	0. 11130		5. 18973	4. 56435	
			26			66
23	0	0. 11104		5. 18999	4. 56501	
			26			67
	10	0. 11078		5. 19025	4. 56568	
			26			66
	20	0. 11052		5. 19051	4. 56634	
			25			67
	30	0. 11027		5. 19076	4. 56701	
			26			66
	40	0. 11001		5. 19102	4. 56767	
			26			67
	50	0. 10975		5. 19128	4. 56834	
			25			66

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
24	0	0. 10950		5. 19153	4. 56900	
			26			66
	10	0. 10924		5. 19179	4. 56966	
			25			66
	20	0. 10899		5. 19204	4. 57032	
			26			66
	30	0. 10873		5. 19230	4. 57098	
			25			66
	40	0. 10848		5. 19255	4. 57164	
			26			66
	50	0. 10822		5. 19281	4. 57230	
			25			66
25	0	0. 10797		5. 19306	4. 57296	
			25			66
	10	0. 10772		5. 19331	4. 57362	
			26			66
	20	0. 10746		5. 19357	4. 57428	
			25			66
	30	0. 10721		5. 19382	4. 57494	
			25			65
	40	0. 10696		5. 19407	4. 57559	
			25			66
	50	0. 10671		5. 19432	4. 57625	
			25			65
26	0	0. 10646		5. 19457	4. 57690	
			26			66
	10	0. 10620		5. 19483	4. 57756	
			25			65
	20	0. 10595		5. 19508	4. 57821	
			25			65
	30	0. 10570		5. 19533	4. 57886	
			25			65
	40	0. 10545		5. 19558	4. 57951	
			25			66
	50	0. 10520		5. 19583	4. 58017	
			25			65
27	0	0. 10495		5. 19608	4. 58082	
			24			65
	10	0. 10471		5. 19632	4. 58147	
			25			65
	20	0. 10446		5. 19657	4. 58212	
			25			65
	30	0. 10421		5. 19682	4. 58277	
			25			65
	40	0. 10396		5. 19707	4. 58342	
			25			65
	50	0. 10371		5. 19732	4. 58407	
			24			64
28	0	0. 10347		5. 19756	4. 58471	
			25			65
	10	0. 10322		5. 19781	4. 58536	
			25			65
	20	0. 10297		5. 19806	4. 58601	
			25			64
	30	0. 10272		5. 19831	4. 58665	
			24			65
	40	0. 10248		5. 19855	4. 58730	
			24			64
	50	0. 10224		5. 19879	4. 58794	
			25			65
29	0	0. 10199		5. 19904	4. 58859	
			24			64
	10	0. 10175		5. 19928	4. 58923	
			24			65
	20	0. 10151		5. 19952	4. 58988	
			25			64
	30	0. 10126		5. 19977	4. 59052	
			24			64
	40	0. 10102		5. 20001	4. 59116	
			24			64
	50	0. 10078		5. 20025	4. 59180	
			25			64

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
30	0	0. 10053		5. 20050	4. 59244	
			24			64
	10	0. 10029		5. 20074	4. 59308	
			24			64
	20	0. 10005		5. 20098	4. 59372	
			24			64
	30	0. 09981		5. 20122	4. 59436	
			24			64
	40	0. 09957		5. 20146	4. 59500	
			24			64
	50	0. 09933		5. 20170	4. 59564	
			24			63
31	0	0. 09909		5. 20194	4. 59627	
			24			64
	10	0. 09885		5. 20218	4. 59691	
			24			64
	20	0. 09861		5. 20242	4. 59755	
			24			63
	30	0. 09837		5. 20266	4. 59818	
			24			64
	40	0. 09813		5. 20290	4. 59882	
			24			63
	50	0. 09789		5. 20314	4. 59945	
			24			63
32	0	0. 09765		5. 20338	4. 60008	
			24			64
	10	0. 09741		5. 20362	4. 60072	
			23			63
	20	0. 09718		5. 20385	4. 60135	
			24			63
	30	0. 09694		5. 20409	4. 60198	
			24			63
	40	0. 09670		5. 20433	4. 60261	
			23			63
	50	0. 09647		5. 20456	4. 60324	
			24			63
33	0	0. 09623		5. 20480	4. 60387	
			24			63
	10	0. 09599		5. 20504	4. 60450	
			23			63
	20	0. 09576		5. 20527	4. 60513	
			24			63
	30	0. 09552		5. 20551	4. 60576	
			23			63
	40	0. 09529		5. 20574	4. 60639	
			23			62
	50	0. 09506		5. 20597	4. 60701	
			24			63
34	0	0. 09482		5. 20621	4. 60764	
			23			63
	10	0. 09459		5. 20644	4. 60827	
			24			63
	20	0. 09435		5. 20668	4. 60890	
			23			62
	30	0. 09412		5. 20691	4. 60952	
			23			63
	40	0. 09389		5. 20714	4. 61015	
			23			62
	50	0. 09366		5. 20737	4. 61077	
			23			62
35	0	0. 09343		5. 20760	4. 61139	
			24			63
	10	0. 09319		5. 20784	4. 61202	
			23			62
	20	0. 09296		5. 20807	4. 61264	
			23			62
	30	0. 09273		5. 20830	4. 61326	
			23			62
	40	0. 09250		5. 20853	4. 61388	
			23			62
	50	0. 09227		5. 20876	4. 61450	
			23			62

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
36	0	0.09204		5.20899	4.61512	
	10	0.09181	23	5.20922	4.61574	62
	20	0.09158	23	5.20945	4.61636	62
	30	0.09136	22	5.20967	4.61698	62
	40	0.09113	23	5.20990	4.61760	62
	50	0.09090	23	5.21013	4.61822	62
			23			61
37	0	0.09067		5.21036	4.61883	
	10	0.09044	23	5.21059	4.61945	62
	20	0.09022	22	5.21081	4.62006	61
	30	0.08999	23	5.21104	4.62068	62
	40	0.08976	23	5.21127	4.62129	61
	50	0.08954	22	5.21149	4.62191	62
			23			61
38	0	0.08931		5.21172	4.62252	
	10	0.08909	22	5.21194	4.62313	61
	20	0.08886	23	5.21217	4.62375	62
	30	0.08864	22	5.21239	4.62436	61
	40	0.08842	22	5.21261	4.62497	61
	50	0.08819	23	5.21284	4.62558	61
			22			61
39	0	0.08797		5.21306	4.62619	
	10	0.08774	23	5.21329	4.62680	61
	20	0.08752	22	5.21351	4.62741	61
	30	0.08730	22	5.21373	4.62802	61
	40	0.08708	22	5.21395	4.62863	61
	50	0.08686	22	5.21417	4.62923	60
			22			61
40	0	0.08664		5.21439	4.62984	
	10	0.08641	23	5.21462	4.63045	61
	20	0.98619	22	5.21484	4.63105	60
	30	0.08597	22	5.21506	4.63166	61
	40	0.08575	22	5.21528	4.63226	60
	50	0.08553	22	5.21550	4.63287	61
			22			60
41	0	0.08531		5.21572	4.63347	
	10	0.08510	21	5.21593	4.63407	60
	20	0.08488	22	5.21615	4.63468	61
	30	0.08466	22	5.21637	4.63528	60
	40	0.08444	22	5.21659	4.63588	60
	50	0.08422	22	5.21681	4.63648	60
			21			60

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
42	0	0.08401		5.21702	4.63708	
	10	0.08379	22	5.21724	4.63768	60
	20	0.08357	22	5.21746	4.63828	60
	30	0.08336	21	5.21767	4.63888	60
	40	0.08314	22	5.21789	4.63948	60
	50	0.08293	21	5.21810	4.64008	60
			22			60
43	0	0.08271		5.21832	4.64068	
	10	0.08250	21	5.21853	4.64127	59
	20	0.08228	22	5.21875	4.64187	60
	30	0.08207	21	5.21896	4.64246	59
	40	0.08185	22	5.21918	4.64306	60
	50	0.08164	21	5.21939	4.64365	59
			21			60
44	0	0.08143		5.21960	4.64425	
	10	0.08121	22	5.21982	4.64484	59
	20	0.08100	21	5.22003	4.64544	60
	30	0.08079	21	5.22024	4.64603	59
	40	0.08058	21	5.22045	4.64662	59
	50	0.08036	22	5.22067	4.64721	59
			21			59
45	0	0.08015		5.22088	4.64780	
	10	0.07994	21	5.22109	4.64839	59
	20	0.07973	21	5.22130	4.64898	59
	30	0.07952	21	5.22151	4.64957	59
	40	0.07931	21	5.22172	4.65016	59
	50	0.07910	21	5.22193	4.65075	59
			21			59
46	0	0.07889		5.22214	4.65134	
	10	0.07868	21	5.22235	4.65193	59
	20	0.07848	20	5.22255	4.65251	58
	30	0.07827	21	5.22276	4.65310	59
	40	0.07806	21	5.22297	4.65369	59
	50	0.07785	21	5.22318	4.65427	58
			20			59
47	0	0.07765		5.22338	4.65486	
	10	0.07744	21	5.22359	4.65544	58
	20	0.07723	21	5.22380	4.65602	58
	30	0.07703	20	5.22400	4.65661	59
	40	0.07682	21	5.22421	4.65719	58
	50	0.07661	21	5.22442	4.65777	58
			20			59

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
48	0	0.07641		5.22462	4.65836	
	10	0.07620	21	5.22483	4.65895	59
	20	0.07600	20	5.22503	4.65952	57
	30	0.07579	21	5.22524	4.66010	58
	40	0.07559	20	5.22544	4.66068	58
	50	0.07539	20	5.22564	4.66126	58
			21			58
49	0	0.67518		5.22585	4.66184	
	10	0.07498	20	5.22605	4.66241	57
	20	0.07478	20	5.22625	4.66299	58
	30	0.07458	20	5.22645	4.66357	58
	40	0.07437	21	5.22666	4.66415	58
	50	0.07417	20	5.22686	4.66472	57
			20			58
50	0	0.07397		5.22706	4.66530	
	10	0.07377	20	5.22726	4.66588	58
	20	0.07357	20	5.22746	4.66645	57
	30	0.07337	20	5.22766	4.66702	57
	40	0.07317	20	5.22786	4.66760	58
	50	0.07297	20	5.22806	4.66817	57
			20			57
51	0	0.07277		5.22826	4.66874	
	10	0.07257	20	5.22846	4.66932	58
	20	0.07237	20	5.22866	4.66989	57
	30	0.07217	20	5.22886	4.67046	57
	40	0.07197	20	5.22906	4.67103	57
	50	0.07178	19	5.22925	4.67160	57
			20			57
52	0	0.07158		5.22945	4.67217	
	10	0.07138	20	5.22965	4.67274	57
	20	0.07119	19	5.22984	4.67331	57
	30	0.07099	20	5.23004	4.67388	57
	40	0.07079	20	5.23024	4.67445	57
	50	0.07060	19	5.23043	4.67502	57
			20			56
53	0	0.07040		5.23063	4.67558	
	10	0.07021	19	5.23082	4.67615	57
	20	0.07001	20	1.23102	4.67671	56
	30	0.06982	19	5.23121	4.67728	57
	40	0.06962	20	5.23141	4.67785	57
	50	0.06943	19	5.23160	4.67841	56
			20			56

M.	S.	Log. $\frac{1}{2}$ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
54	0	0.06923		5.23180	4.67897	
	10	0.06904	19	5.23199	4.67954	57
	20	0.06885	19	5.23218	4.68010	56
	30	0.06865	20	5.23238	4.68066	56
	40	0.06846	19	5.23257	4.68123	57
	50	0.06827	19	5.23276	4.68179	56
			19			56
55	0	0.06808		5.23295	4.68235	
	10	0.06789	19	5.23314	4.68291	56
	20	0.06770	19	5.23333	4.68347	56
	30	0.06751	19	5.23352	4.68403	56
	40	0.06731	20	5.23372	4.68459	56
	50	0.06712	19	5.23391	4.68515	56
			19			56
56	0	0.06693		5.23410	4.68571	
	10	0.06674	19	5.23429	4.68627	56
	20	0.06656	18	5.23447	4.68682	55
	30	0.06637	19	5.23466	4.68738	56
	40	0.06618	19	5.23485	4.68794	56
	50	0.06599	19	5.23504	4.68849	55
			19			56
57	0	0.06580		5.23523	4.68905	
	10	0.06561	19	5.23542	4.68960	55
	20	0.06543	18	5.23560	4.69016	56
	30	0.06524	19	5.23579	4.69071	55
	40	0.06505	19	5.23598	4.69127	56
	50	0.06487	18	5.23616	4.69182	55
			19			55
58	0	0.06468		5.23635	4.69237	
	10	0.06449	19	5.23654	4.69292	55
	20	0.06431	18	5.23672	4.69348	56
	30	0.06412	19	5.23691	4.69403	55
	40	0.06394	18	5.23709	4.69458	55
	50	0.06375	19	5.23728	4.69513	55
			18			55
59	0	0.06357		5.23746	4.69568	
	10	0.06338	19	5.23765	4.69623	55
	20	0.06320	18	5.23783	4.69678	55
	30	0.06302	18	5.23801	4.69733	55
	40	0.06283	19	5.23820	4.69787	54
	50	0.06265	18	5.23838	4.69842	55
			18			55

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
0	0	0. 06247		5. 23856	4. 69897	
	10	0. 06229	18	5. 23874	4. 69952	55
	20	0. 06211	18	5. 23892	4. 70006	54
	30	0. 06192	19	5. 23911	4. 70061	55
	40	0. 06174	18	5. 23929	4. 70115	54
	50	0. 06156	18	5. 23947	4. 70170	55
						54
1	0	0. 06138		5. 23965	4. 70224	
	10	0. 06120	18	5. 23983	4. 70279	55
	20	0. 06102	18	5. 24001	4. 70333	54
	30	0. 06084	18	5. 24019	4. 70387	54
	40	0. 06066	18	5. 24037	4. 70442	55
	50	0. 06048	18	5. 24055	4. 70496	54
						54
2	0	0. 06030		5. 24073	4. 70550	
	10	0. 06012	18	5. 24091	4. 70604	54
	20	0. 05995	17	5. 24108	4. 70658	54
	30	0. 05977	18	5. 24126	4. 70712	54
	40	0. 05959	18	5. 24144	4. 70766	54
	50	0. 05941	18	5. 24162	4. 70820	54
						54
3		0. 05924		5. 24179	4. 70874	
	10	0. 05906	18	5. 24197	4. 70928	54
	20	0. 05888	18	5. 24215	4. 70982	54
	30	0. 05871	17	5. 24232	4. 71036	54
	40	0. 05853	18	5. 24250	4. 71089	53
	50	0. 05836	17	5. 24267	4. 71143	54
			18			54
4	0	0. 05818		5. 24285	4. 71197	
	10	0. 05801	17	5. 24302	4. 71250	53
	20	0. 05783	18	5. 24320	4. 71304	54
	30	0. 05766	17	5. 24337	4. 71357	53
	40	0. 05748	18	5. 24355	4. 71411	54
	50	0. 05731	17	5. 24372	4. 71464	53
			17			54
5	0	0. 05714		5. 24389	4. 71518	
	10	0. 05696	18	5. 24407	4. 71571	53
	20	0. 05679	17	5. 24424	4. 71624	53
	30	0. 05662	17	5. 24441	4. 71678	54
	40	0. 05645	17	5. 24458	4. 71731	53
	50	0. 05627	18	5024476	4. 71784	53
			17			53

M.	S.	Log. $\frac{1}{2}$ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
6	0	0.05610		5.24493	4.71837	
	10	0.05593	17	5.24510	4.71890	53
	20	0.05576	17	5.24527	4.71943	53
	30	0.05559	17	5.24544	4.71996	53
	40	0.05542	17	5.24561	4.72049	53
	50	0.05525	17	5.24578	4.72102	53
7	0	0.05508		5.24595	4.72155	
	10	0.05491	17	5.24612	4.72208	53
	20	0.05474	17	5.24629	4.72260	52
	30	0.05457	17	5.24646	4.72313	53
	40	0.05440	17	5.24663	4.72366	53
	50	0.05423	17	5.24680	4.72418	52
8	0	0.05406		5.24697	4.72471	53
	10	0.05389	17	5.24714	4.72523	52
	20	0.05373	16	5.24730	4.72576	53
	30	0.05356	17	5.24747	4.72628	52
	40	0.05340	16	5.24763	4.72681	53
	50	0.05323	17	5.24780	4.72733	52
9	0	0.05306		5.24797	4.72785	
	10	0.05290	16	5.24813	4.72838	53
	20	0.05273	17	5.24830	4.72890	52
	30	0.05257	16	5.24846	4.72942	52
	40	0.05240	17	5.24863	4.72994	52
	50	0.05224	16	5.24879	4.73046	52
10	0	0.05207		5.24896	4.73098	52
	10	0.05191	16	5.24912	4.73150	52
	20	0.05174	17	5.24929	4.73202	52
	30	0.05158	16	5.24945	4.73254	52
	40	0.05142	16	5.24961	4.73306	52
	50	0.05125	17	5.24978	4.73358	52
11	0	0.05109	16	5.24994	4.73410	52
	10	0.05093	16	5.25010	4.73462	52
	20	0.05076	17	5.25027	4.73514	51
	30	0.05060	16	5.25043	4.73565	52
	40	0.05044	16	5.25059	4.73617	51
	50	0.05028	16	5.25075	4.73668	52

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
12	0	0.05012		5.25091	4.73720	
	10	0.04996	16	5.25107	4.73772	52
	20	0.04980	16	5.25123	4.73823	51
	30	0.04964	16	5.25139	4.73874	51
	40	0.04948	16	5.25155	4.73926	52
	50	0.64932	16	5.25171	4.73977	51
13	0	0.04916		5.25187	4.74028	51
	10	0.04900	16	5.25203	4.74080	52
	20	0.04884	16	5.25219	4.74131	51
	30	0.04868	16	5.25235	4.74182	51
	40	0.04852	16	5.25251	4.74233	51
	50	0.04837	15	5.25266	4.74284	51
14	0	0.04821	16	5.25282	4.74335	51
	10	0.04805	16	5.25298	4.74386	51
	20	0.04789	16	5.25314	4.74437	51
	30	0.04774	15	5.25329	4.74488	51
	40	0.04758	16	5.25345	4.74539	51
	50	0.04743	15	5.25360	4.74590	51
15	0	0.04727	16	5.25376	4.74641	51
	10	0.04711	16	5.25392	4.74692	50
	20	0.04696	15	5.25407	4.74742	51
	30	0.04680	16	5.25423	4.74793	51
	40	0.04665	15	5.25438	4.74844	50
	50	0.04649	16	5.25454	4.74894	51
16	0	0.04634	15	5.25469	4.74945	50
	10	0.04619	15	5.25484	4.74995	51
	20	0.04603	16	5.25500	4.75046	50
	30	0.04588	15	5.25515	4.75096	51
	40	0.04573	15	5.25530	4.75147	50
	50	0.04557	16	5.25546	4.75197	50
17	0	0.04542	15	5.25561	4.75247	51
	10	0.04527	15	5.25576	4.75298	50
	20	0.04512	15	5.25591	4.75348	50
	30	0.04496	16	5.25607	4.75398	50
	40	0.04481	15	5.25622	4.75448	50
	50	0.04466	15	5.25637	4.7549	51

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
18	0	0.04451		5.25652	4.75549	
	10	0.04436	15	5.25667	4.75599	50
	20	0.04421	15	5.25682	4.75649	50
	30	0.04406	15	5.25697	4.75699	50
	40	0.04391	15	5.25712	4.75748	49
	50	0.04376	15	5.25727	4.75798	50
19	0	0.04361		5.25742	4.75848	50
	10	0.04346	15	5.25757	4.75898	50
	20	0.04332	14	5.25771	4.75948	49
	30	0.04317	15	5.25786	4.75997	50
	40	0.04302	15	5.25801	4.76047	50
	50	0.04287	15	5.25816	4.76097	49
20	0	0.04272	15	5.25831	4.76146	49
	10	0.04258	14	5.25845	4.76196	50
	20	0.04243	15	5.25860	4.76245	49
	30	0.04228	15	5.25875	4.76295	50
	40	0.04214	14	5.25889	4.76344	49
	50	0.04199	15	5.25904	4.76394	50
21	0	0.04185	14	5.25918	4.76443	49
	10	0.04170	15	5.25933	4.76492	49
	20	0.04155	15	5.25948	4.76542	50
	30	0.04141	14	5.25962	4.76591	49
	40	0.04127	14	5.25976	4.76640	49
	50	0.04112	15	5.25991	4.76689	49
22	0	0.04098	14	5.26005	4.76738	49
	10	0.04083	15	5.26020	4.76787	49
	20	0.04069	14	5.26034	4.76836	49
	30	0.04055	14	5.26048	4.76885	49
	40	0.04040	15	5.26063	4.76934	49
	50	0.04026	14	5.26077	4.76983	49
23	0	0.04012	14	5.26091	4.77032	49
	10	0.03998	14	5.26105	4.77081	49
	20	0.03983	15	5.26120	4.77130	49
	30	0.03969	14	5.26134	4.77179	48
	40	0.03955	14	5.26148	4.77227	49
	50	0.03941	14	5.26162	4.77276	49

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
24	0	0.03927		5.26176	4.77325	
			14			48
	10	0.03913		5.26190	4.77373	
			14			49
	20	0.03899		5.26204	4.77422	
			14			48
	30	0.03885		5.26218	4.77470	
			14			49
	40	0.03871		5.26232	4.77519	
			14			48
	50	0.03857		5.26246	4.77567	
			14			49
25	0	0.03843		5.26260	4.77616	
			14			48
	10	0.03829		5.26274	4.77664	
			14			49
	20	0.03815		5.26288	4.77713	
			13			48
	30	0.03802		5.26301	4.77761	
			14			48
	40	0.03788		5.26315	4.77809	
			14			48
	50	0.03774		5.26329	4.77857	
			14			49
26	0	0.03760		5.26343	4.77906	
			14			48
	10	0.03746		5.26357	4.77954	
			13			48
	20	0.03733		5.26370	4.78002	
			14			48
	30	0.03719		5.26384	4.78050	
			13			48
	40	0.03706		5.26397	4.78098	
			14			48
	50	0.03692		5.26411	4.78146	
			14			48
27	0	0.03678		5.26425	4.78194	
			13			48
	10	0.03665		5.26438	4.78242	
			14			48
	20	0.03651		5.26452	4.78290	
			13			48
	30	0.03638		5.26465	4.78338	
			14			47
	40	0.03624		5.26479	4.78385	
			13			48
	50	0.03611		5.26492	4.78433	
			14			48
28	0	0.03597		5.26506	4.78481	
			13			48
	10	0.03584		5.26519	4.78529	
			13			47
	20	0.03571		5.26532	4.78576	
			14			48
	30	0.03557		5.26546	4.78624	
			13			47
	40	c.03544		5.26559	4.78671	
			13			48
	50	0.03531		5.26572	4.78719	
			14			48
29	0	0.03517		5.26586	4.78767	
			13			47
	10	0.03504		5.26599	4.78814	
			13			47
	20	0.03491		5.26612	4.78861	
			13			47
	30	0.03478		5.26625	4.78908	
			13			48
	40	0.03465		5.26638	4.78956	
			13			47
	50	0.03452		5.26651	4.79003	
			14			48

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
30	0	0.03438		5.26665	4.79051	
	10	0.03425	13	5.26678	4.79098	47
	20	0.03412	13	5.26691	4.79145	47
	30	0.03399	13	5.26704	4.79192	47
	40	0.03386	13	5.26717	4.79240	48
	50	0.03373	13	5.26730	4.79287	47
			13			47
31	0	0.03360		5.26743	4.79334	
	10	0.03348	12	5.26755	4.79381	47
	20	0.03335	13	5.26768	4.79428	47
	30	0.03322	13	5.26781	4.79475	47
	40	0.03309	13	5.26794	4.79522	47
	50	0.03296	13	5.26807	4.79568	46
			13			47
32	0	0.03283		5.26820	4.79615	
	10	0.03271	12	5.26832	4.79662	47
	20	0.03258	13	5.26845	4.79709	47
	30	0.03245	13	5.26858	4.79756	47
	40	0.03233	12	5.26870	4.79802	46
	50	0.03220	13	5.26883	4.79849	47
			13			47
33	0	0.03207		5.26896	4.79895	
	10	0.03195	12	5.26908	4.79942	46
	20	0.03182	13	5.26921	4.79989	47
	30	0.03170	12	5.26933	4.80035	46
	40	0.03157	13	5.26946	4.80082	47
	50	0.03145	12	5.26958	4.80128	46
			13			47
34	0	0.03132		5.26971	4.80175	
	10	0.03120	12	5.26983	4.80221	46
	20	0.03107	13	5.26996	4.80267	46
	30	0.03095	12	5.27008	4.80314	47
	40	0.03083	12	5.27020	4.80360	46
	50	0.03070	13	5.27033	4.80406	46
			12			46
35	0	0.03058		5.27045	4.80452	
	10	0.03046	12	5.27057	4.80493	46
	20	0.03034	12	5.27069	4.80544	46
	30	0.03021	13	5.27082	4.80591	47
	40	0.03009	12	5.27094	4.80637	46
	50	0.02997	12	5.27106	4.80683	46
			12			46

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
36	0	0.02985	12	5.27110	4.80729	46
	10	0.02973	12	5.27130	4.80775	45
	20	0.02961	12	5.27142	4.80820	46
	30	0.02949	12	5.27154	4.80866	46
	40	0.02937	12	5.27166	4.80912	46
	50	0.02925		5.27178	4.80958	
			12			46
37	0	0.02913	12	5.27190	4.81004	45
	10	0.02901	12	5.27202	4.81049	46
	20	0.02889	12	5.27214	4.81095	46
	30	0.02877	12	5.27226	4.81141	45
	40	0.02865	12	5.27238	4.81186	46
	50	0.02853		5.27250	4.81232	
			12			45
38	0	0.02841	12	5.27262	4.81277	46
	10	0.02829	11	5.27274	4.81323	45
	20	0.02818	12	5.27285	4.81368	46
	30	0.02806	12	5.27297	4.81414	45
	40	0.02794	11	5.27309	4.81459	46
	50	0.02783		5.27320	4.81505	
			12			45
39	0	0.02771	12	5.27332	4.81550	45
	10	0.02759	11	5.27344	4.81595	46
	20	0.02748	12	5.27355	4.81641	45
	30	0.02736	12	5.27367	4.81686	45
	40	0.02724	11	5.27379	4.81731	45
	50	0.02713		5.27390	4.81776	
			12			45
40	0	0.02701	11	5.27402	4.81821	45
	10	0.02690	12	5.27413	4.81866	45
	20	0.02678	11	5.27425	4.81911	45
	30	0.02667	11	5.27436	4.81956	45
	40	0.02656	12	5.27447	4.82001	45
	50	0.02644		5.27459	4.82046	
			11			45
41	0	0.02633	11	5.27470	4.82091	45
	10	0.02622	12	5.27481	4.82136	45
	20	0.02610	11	5.27493	4.82181	45
	30	0.02599	11	5.27504	4.82226	45
	40	0.02588	11	5.27515	4.82271	44
	50	0.02577		5.27526	4.82315	
			12			45

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
42	0	0.02565		5.27538	4.82360	
	10	0.02554	11	5.27549	4.82405	45
	20	0.02543	11	5.27560	4.82449	44
	30	0.02532	11	5.27571	4.82494	45
	40	0.02521	11	5.27582	4.82538	44
	50	0.02510		5.27593	4.82583	45
			11			45
43	0	0.02499		5.27604	4.82628	
	10	0.02488	11	5.27615	4.82672	44
	20	0.02477	11	5.27626	4.82716	44
	30	0.02466	11	5.27637	4.82761	45
	40	0.02455	11	5.27648	4.82805	44
	50	0.02444		5.27659	4.82850	45
			11			44
44	0	0.02433		5.27670	4.82894	
	10	0.02422	11	5.27681	4.82938	44
	20	0.02411	11	5.27692	4.82982	44
	30	0.02400	11	5.27703	4.83026	44
	40	0.02390	10	5.27713	4.83071	45
	50	0.02379	11	5.27724	4.83115	44
			11			44
45	0	0.02368		5.27735	4.83159	
	10	0.02357	11	5.27746	4.83203	44
	20	0.02347	10	5.27756	4.83247	44
	30	0.02336	11	5.27767	4.83291	44
	40	0.02326	10	5.27777	4.83335	44
	50	0.02315	11	5.27788	4.83379	44
			11			44
46	0	0.02304		5.27799	4.83423	
	10	0.02294	10	5.27809	4.83467	44
	20	0.02283	11	5.27820	4.83510	43
	30	0.02273	10	5.27830	4.83554	44
	40	0.02262	11	5.27841	4.83598	44
	50	0.02252	10	5.27851	4.83642	44
			11			43
47	0	0.02241		5.27862	4.83685	
	10	0.02231	10	5.27872	4.83729	44
	20	0.02221	10	5.27882	4.83773	44
	30	0.02210	11	5.27893	4.83816	43
	40	0.02200	10	5.27903	4.83860	44
	50	0.02190	10	5.27913	4.83903	43
			11			44

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
48	0	0. 02179		5. 27924	4. 83947	
	10	0. 02169	10	5. 27934	4. 83990	43
	20	0. 02159	10	5. 27944	4. 84034	44
	30	0. 02149	10	5. 27954	4. 84077	43
	40	0. 02139	10	5. 27964	4. 84120	43
	50	0. 02128	11	5. 27975	4. 84164	44
			10			43
49	0	0. 02118		5. 27985	4. 84207	
	10	0. 02108	10	5. 27995	4. 84250	43
	20	0. 02098	10	5. 28005	4. 84293	43
	30	0. 02088	10	5. 28015	4. 84337	44
	40	0. 02078	10	5. 28025	4. 84380	43
	50	0. 02068	10	5. 28035	4. 84423	43
			10			43
50	0	0. 02058		5. 28045	4. 84466	
	10	0. 02048	10	5. 28055	4. 84509	43
	20	0. 02038	10	5. 28065	4. 84552	43
	30	0. 02028	10	5. 28075	4. 84595	43
	40	0. 02018	10	5. 28085	4. 84638	43
	50	0. 02009	9	5. 28094	4. 84681	43
			10			43
51	0	0. 01999		5. 28104	4. 84724	
	10	0. 01989	10	5. 28114	4. 84767	43
	20	0. 01979	10	5. 28124	4. 84810	43
	30	0. 01969	10	5. 28134	4. 84852	42
	40	0. 01960	9	5. 28143	4. 84895	43
	50	0. 01950	10	5. 28153	4. 84938	43
			10			43
52	0	0. 01940		5. 28163	4. 84981	
	10	0. 01931	9	5. 28172	4. 85023	42
	20	0. 01921	10	5. 28182	4. 85066	43
	30	0. 01912	9	5. 28191	4. 85108	42
	40	0. 01902	10	5. 28201	4. 85151	43
	50	0. 01892	10	5. 28211	4. 85194	43
			9			42
53	0	0. 01883		5. 28220	4. 85236	
	10	0. 01873	10	5. 28230	4. 85278	42
	20	0. 01864	9	5. 28239	4. 85321	43
	30	0. 01854	10	5. 28249	4. 85363	42
	40	0. 01845	9	5. 28258	4. 85406	43
	50	0. 01836	9	5. 28267	4. 85448	42
			10			42

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference
54	0	0.01826		5.28277	4.85490	
	10	0.01817	9	5.28286	4.85533	43
	20	0.01808	9	5.28295	4.85575	42
	30	0.01798	10	5.28305	4.85617	42
	40	0.01789	9	5.28314	4.85659	42
	50	0.01780	9	5.28323	4.85701	42
			9			43
55	0	0.01771		5.28332	4.85744	
	10	0.01761	10	5.28342	4.85786	42
	20	0.01752	9	5.28351	4.85828	42
	30	0.01743	9	5.28360	4.85870	42
	40	0.01734	9	5.28369	4.85912	42
	50	0.01725	9	5.28378	4.85954	42
			9			42
56	0	0.01716		5.28387	4.85996	
	10	0.01707	9	5.28396	4.86037	41
	20	0.01698	9	5.28405	4.86079	42
	30	0.01689	9	5.28414	4.86121	42
	40	0.01680	9	5.28423	4.86163	42
	50	0.01671	9	5.28432	4.86205	42
			9			41
57	0	0.01662		5.28441	4.86246	
	10	0.01653	9	5.28450	4.36288	42
	20	0.01644	9	5.28459	4.86330	42
	30	0.01635	9	5.28468	4.86372	42
	40	0.01626	9	5.28477	4.86413	41
	50	0.01618	8	5.28485	4.86455	42
			9			41
58	0	0.01609		5.28494	4.86496	
	10	0.01600	9	5.28503	4.86538	42
	20	0.01591	9	5.28512	4.86579	41
	30	0.01583	8	5.28520	4.86621	42
	40	0.01574	9	5.28529	4.86662	41
	50	0.01565	9	5.28538	4.86704	42
			8			41
59	0	0.01557		5.28546	4.86745	
	10	0.01548	9	5.28555	4.86786	41
	20	0.01540	8	5.28563	4.86828	42
	30	0.01531	9	5.28572	4.86869	41
	40	0.01523	8	5.28580	4.86910	41
	50	0.01514	9	5.28589	4.86951	41
			8			41

M.	S.	Log. ½elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
0	0	0. 01506		5. 28597	4. 86992	
	10	0. 01497	9	5. 28606	4. 87034	42
	20	0. 01489	8	5. 28614	4. 87075	41
	30	0. 01480	9	5. 28623	4. 87116	41
	40	0. 01472	8	5. 28631	4. 87157	41
	50	0. 01464	8	5. 28639	4. 87198	41
			9			41
1	0	0. 01455		5. 28648	4. 87239	
	10	0. 01447	8	5. 28656	4. 87280	41
	20	0. 01439	8	5. 28664	4. 87321	41
	30	0. 01430	9	5. 28673	4. 87362	41
	40	0. 01422	8	5. 28681	4. 87402	40
	50	0. 01414	8	5. 28689	4. 87443	41
			8			41
2	0	0. 01406		5. 28697	4. 87484	
	10	0. 01398	8	5. 28705	4. 87525	41
	20	0. 01390	8	5. 28713	4. 87566	41
	30	0. 01381	9	5. 28722	4. 87606	40
	40	0. 01373	8	5. 28730	4. 87647	41
	50	0. 01365	8	5. 28738	4. 87688	41
			8			40
3	0	0. 01357		5. 28746	4. 87728	
	10	0. 01349	8	5. 28754	4. 87769	41
	20	0. 01341	8	5. 28762	4. 87809	40
	30	0. 01333	9	5. 28770	4. 87850	41
	40	0. 01325	8	5. 28778	4. 87890	40
	50	0. 01317	8	5. 28786	4. 87931	41
			7			40
4	0	0. 01310		5. 28793	4. 87971	
	10	0. 01302	8	5. 28801	4. 88012	41
	20	0. 01294	8	5. 28809	4. 88052	40
	30	0. 01286	8	5. 28817	4. 88093	41
	40	0. 01278	8	5. 28825	4. 88133	40
	50	0. 01270	8	5. 28833	4. 88173	40
			7			40
5	0	0. 01263		5. 28840	4. 88213	
	10	0. 01255	8	5. 28848	4. 88254	41
	20	0. 01247	8	5. 28856	4. 88294	40
	30	0. 01240	7	5. 28863	4. 88334	40
	40	0. 01232	8	5. 28871	4. 88374	40
	50	0. 01224	8	5. 28879	4. 88414	40
			7			40

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference
6	0	0. 01217	8	5. 28886	4. 88454	40
	10	0. 01209	7	5. 28894	4. 88494	40
	20	0. 01202	8	5. 28901	4. 88534	40
	30	0. 01194	7	5. 28909	4. 88574	40
	40	0. 01187	8	5. 28916	4. 88614	40
	50	0. 01179		5. 28924	4. 88654	
			7			40
7	0	0. 01172	8	5. 28931	4. 88694	40
	10	0. 01164	7	5. 28939	4. 88734	40
	20	0. 01157	7	5. 28946	4. 88774	40
	30	0. 01150	8	5. 28953	4. 88814	39
	40	0. 01142	7	5. 28961	4. 88853	40
	50	0. 01135		5. 28968	4. 88893	
			7			40
8	0	0. 01128	8	5. 28975	4. 88933	40
	10	0. 01120	7	5. 28983	4. 88973	39
	20	0. 01113	7	5. 28990	4. 89012	40
	30	0. 01106	7	5. 28997	4. 89052	39
	40	0. 01099	8	5. 29004	4. 89091	40
	50	0. 01091		5. 29012	4. 89131	
			7			40
9	0	0. 01084	7	5. 29019	4. 89171	39
	10	0. 01077	7	5. 29026	4. 89210	40
	20	0. 01070	7	5. 29033	4. 89250	39
	30	0. 01063	7	5. 29040	4. 89289	39
	40	0. 01056	7	5. 29047	4. 89328	40
	50	0. 01049		5. 29054	4. 89368	
			7			39
10	0	0. 01042	7	5. 29061	4. 89407	40
	10	0. 01035	7	5. 29068	4. 89447	39
	20	0. 01028	7	5. 29075	4. 89486	39
	30	0. 01021	7	5. 29082	4. 89525	39
	40	0. 01014	7	5. 29089	4. 89564	40
	50	0. 01007		5. 29096	4. 89604	
			7			39
11	0	0. 01000	7	5. 29103	4. 89643	39
	10	0. 00993	6	5. 29110	4. 89682	39
	20	0. 00987	7	5. 29116	4. 89721	39
	30	0. 00980	7	5. 29123	4. 89760	39
	40	0. 00973	7	5. 29130	4. 89799	39
	50	0. 00966	6	5. 29137	4. 89838	39

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
12	0	0.00960		5.29143	4.89877	
	10	0.00953	7	5.29150	4.89916	39
	20	0.00946	7	5.29157	4.89955	39
	30	0.00940	6	5.29163	4.89994	39
	40	0.00933	7	5.29170	4.90033	39
	50	0.00926	7	5.29177	4.90072	39
			6			39
13	0	0.00920		5.29183	4.90111	
	10	0.00913	7	5.29190	4.90149	38
	20	0.00907	6	5.29196	4.90188	39
	30	0.00900	7	5.29203	4.90227	39
	40	0.00894	6	5.29209	4.90266	39
	50	0.00887	7	5.29216	4.90305	39
			6			38
14	0	0.00881		5.29222	4.90345	
	10	0.00874	7	5.29229	4.90382	39
	20	0.00868	6	5.29235	4.90421	39
	30	0.00862	6	5.29241	4.90459	38
	40	0.00855	7	5.29248	4.90498	39
	50	0.00849	6	5.29254	4.90536	38
			6			39
15	0	0.00843		5.29260	4.90575	
	10	0.00836	7	5.29267	4.90613	38
	20	0.00830	6	5.29273	4.90652	39
	30	0.00824	6	5.29279	4.90690	38
	40	0.00818	6	5.29285	4.90728	38
	50	0.00811	7	5.29292	4.90767	39
			6			38
16	0	0.00805		5.29298	4.90805	
	10	0.00799	6	5.29304	4.90843	38
	20	0.00793	6	5.29310	4.90882	39
	30	0.00787	6	5.29316	4.90920	38
	40	0.00781	6	5.29322	4.90958	38
	50	0.00775	6	5.29328	4.90996	38
			6			38
17	0	0.00769		5.29334	4.91034	
	10	0.00763	6	5.29340	4.91073	39
	20	0.00757	6	5.29346	4.91111	38
	30	0.00751	6	5.29352	4.91149	38
	40	0.00745	6	5.29358	4.91187	38
	50	0.00739	6	5.29364	4.91225	38

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
18	0	0.00733		5.29370	4.91263	
	10	0.00728	5	5.29375	4.91301	38
	20	0.00722	6	5.29381	4.91339	38
	30	0.00716	6	5.29387	4.91377	38
	40	0.00710	6	5.29393	4.91415	38
	50	0.00704	6	5.29399	4.91452	37
			5			38
19	0	0.00699		5.29404	4.91490	
	10	0.00693	6	5.29410	4.91528	38
	20	0.00687	6	5.29416	4.91566	38
	30	0.00682	5	5.29421	4.91603	37
	40	0.00676	6	5.29427	4.91641	38
	50	0.00670	6	5.29433	4.91679	38
			5			37
20	0	0.00665		5.29438	4.91716	
	10	0.00659	6	5.29444	4.91754	38
	20	0.00654	5	5.29449	4.91792	38
	30	0.00648	6	5.29455	4.91830	38
	40	0.00643	5	5.29460	4.91867	37
	50	0.00637	6	5.29466	4.91904	37
			5			38
21	0	0.00632		5.29471	4.91942	
	10	0.00626	6	5.29477	4.91979	37
	20	0.00621	5	5.29482	4.92017	38
	30	0.00616	5	5.29487	4.92054	37
	40	0.00610	6	5.29493	4.92092	38
	50	0.00605	5	5.29498	4.92129	37
			5			37
22	0	0.00600		5.29503	4.92166	
	10	0.00594	6	5.29509	4.92203	37
	20	0.00589	5	5.29514	4.92241	38
	30	0.00584	5	5.29519	4.92278	37
	40	0.00579	5	5.29524	4.92315	37
	50	0.00574	5	5.29529	4.92352	37
			6			38
23	0	0.00568		5.29535	4.92390	
	10	0.00563	5	5.29540	4.92427	37
	20	0.00558	5	5.29545	4.92464	37
	30	0.00553	5	5.29550	4.92501	37
	40	0.00548	5	5.29555	4.92538	37
	50	0.00543	5	5.29560	4.92575	37
			5			37

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
24	0	0. 00538		5. 29565	4. 92612	
	10	0. 00533	5	5. 29570	4. 92649	37
	20	0. 00528	5	5. 29575	4. 92686	37
	30	0. 00523	5	5. 29580	4. 92723	37
	40	0. 00518	5	5. 29585	4. 92760	37
	50	0. 00513	5	5. 29590	4. 92796	36
			5			37
25	0	0. 00508		5. 29595	4. 92833	
	10	0. 00504	4	5. 29599	4. 92870	37
	20	0. 00499	5	5. 29604	4. 92907	37
	30	0. 00494	5	5. 29609	4. 92944	37
	40	0. 00489	5	5. 29614	4. 92980	36
	50	0. 00484	5	5. 29619	4. 93017	37
			4			37
26	0	0. 00480		5. 29623	4. 93054	
	10	0. 00475	5	5. 29628	4. 93090	36
	20	0. 00470	5	5. 29633	4. 93127	37
	30	0. 00466	4	5. 29637	4. 93164	37
	40	0. 00461	5	5. 29642	4. 93200	36
	50	0. 00456	5	5. 29647	4. 93237	37
			4			36
27	0	0. 00452		5. 29651	4. 93273	
	10	0. 00447	5	5. 29656	4. 93310	37
	20	0. 00443	4	5. 29660	4. 93346	36
	30	0. 00438	5	5. 29665	4. 93383	37
	40	0. 00434	4	5. 29669	4. 93419	36
	50	0. 00429	5	5. 29674	4. 93455	36
			4			37
28	0	0. 00425		5. 29678	4. 93492	
	10	0. 00420	5	5. 29683	4. 93528	36
	20	0. 00416	4	5. 29687	4. 93564	36
	30	0. 00412	4	5. 29691	4. 93600	36
	40	0. 00407	5	5. 29696	4. 93637	37
	50	0. 00403	4	5. 29700	4. 93673	36
			4			36
29	0	0. 00399		5. 29704	4. 93709	
	10	0. 00394	5	5. 29709	4. 93745	36
	20	0. 00390	4	5. 29713	4. 93781	36
	30	0. 00386	4	5. 29717	4. 93817	36
	40	0. 00382	4	5. 29721	4. 93854	37
	50	0. 00377	5	5. 29726	4. 93890	36
			4			36

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
30	0	0.00373		5.29730	4.93926	
	10	0.00369	4	5.29734	4.93962	36
	20	0.00365	4	5.29738	4.93998	36
	30	0.00361	4	5.19742	4.94034	36
	40	0.00357	4	5.29746	4.94069	35
	50	0.00353	4	5.29750	4.94105	36
			4			36
31	0	0.00349		5.29754	4.94141	
	10	0.00345	4	5.29758	4.94177	36
	20	0.00341	4	5.29762	4.94213	36
	30	0.00337	4	5.29766	4.94249	36
	40	0.00333	4	5.29770	4.94284	35
	50	0.00329	4	5.29774	4.94320	36
			4			36
32	0	0.00325		5.29778	4.94356	
	10	0.00321	4	5.29782	4.94392	36
	20	0.00317	4	5.29786	4.94427	35
	30	0.00313	4	5.29790	4.94463	36
	40	0.00310	3	5.29793	4.94498	35
	50	0.00306	4	5.29797	4.94534	36
			4			36
33	0	0.00302		5.29801	4.94570	
	10	0.00298	4	5.29805	4.94605	35
	20	0.00295	3	5.29808	4.94641	36
	30	0.00291	4	5.29812	4.94676	35
	40	0.00287	4	5.29816	4.94712	36
	50	0.00284	3	5.29819	4.94747	35
			4			35
34	0	0.00280		5.29823	4.94782	
	10	0.00276	4	5.29827	4.94818	36
	20	0.00273	3	5.29830	4.94853	35
	30	0.00269	4	5.29834	4.94888	35
	40	0.00266	3	5.29837	4.94924	36
	50	0.00262	4	5.29841	4.94959	35
			3			35
35	0	0.00259		5.29844	4.94994	
	10	0.00255	4	5.29848	4.95029	35
	20	0.00252	3	5.29851	4.95065	36
	30	0.00249	3	5.29854	4.95100	35
	40	0.00245	4	5.29858	4.95135	35
	50	0.00242	3	5.29861	4.95170	35
			3			35

M.	S.	Log. ½ elap Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
36	0	0.00239		5.29854	4.95205	
	10	0.00235	4	5.29868	4.95240	35
	20	0.00232	3	5.29871	4.95275	35
	30	0.00229	3	5.29874	4.95310	35
	40	0.00225	4	5.29878	4.95345	35
	50	0.00222	3	5.29881	4.95380	35
			3			35
37	0	0.00219		5.29884	4.95415	
	10	0.00216	3	5.29887	4.95450	35
	20	0.00213	3	5.29890	4.95485	35
	30	0.00310	3	5.29893	4.95520	35
	40	0.00207	3	5.29896	4.95555	35
	50	0.00203	4	5.29900	4.95589	34
			3			35
38	0	0.00200		5.29903	4.95624	
	10	0.00197	3	5.29906	4.95659	35
	20	0.00194	3	5.29909	4.95694	35
	30	0.00191	3	5.29912	4.95728	34
	40	0.00188	3	5.29915	4.95763	35
	50	0.00185	3	5.29918	4.95798	35
			2			34
39	0	0.00183		5.29920	4.95832	
	10	0.00180	3	5.29923	4.95867	35
	20	0.00177	3	5.29926	4.95902	35
	30	0.00174	3	5.29929	4.95936	34
	40	0.00171	3	5.29932	4.95971	35
	50	0.00168	3	5.29935	4.96005	34
			2			34
40	0	0.00166		5.29937	4.96040	
	10	0.00163	3	5.29940	4.96074	34
	20	0.00160	3	5.29943	4.96109	35
	30	0.00157	3	5.29946	4.96143	34
	40	0.00155	2	5.29948	4.96177	34
	50	0.00152	3	5.29951	4.96212	35
			3			34
41	0	0.00149		5.29954	4.96246	
	10	0.00147	2	5.29956	4.96280	34
	20	0.00144	3	5.29959	4.96315	35
	30	0.00142	2	5.29961	4.96349	34
	40	0.00139	3	5.29964	4.96383	34
	50	0.00137	2	5.29966	4.96417	34
			3			34

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
42	0	0.00134		5.29969	4.96451	
	10	0.00132	2	5.29971	4.96486	35
	20	0.00129	3	5.29974	4.96520	34
	30	0.00127	2	5.29976	4.96554	34
	40	0.00124	3	5.29979	4.96588	34
	50	0.00122	2	5.29981	4.96622	34
			2			34
43	0	0.00120		5.29983	4.96656	
	10	0.00117	3	5.29986	4.96690	34
	20	0.00115	2	5.29988	4.96724	34
	30	0.00113	2	5.29990	4.96758	34
	40	0.00110	3	5.29993	4.96792	34
	50	0.00108	2	5.29995	4.96826	34
			2			34
44	0	0.00106		5.29997	4.96860	
	10	0.00104	2	5.29999	4.96894	34
	20	0.00102	2	5.30001	4.96927	33
	30	0.00099	3	5.30004	4.96961	34
	40	0.00097	2	5.30006	4.96995	34
	50	0.00095	2	5.30008	4.97029	34
			2			33
45	0	0.00093		5.30010	4.97062	
	10	0.00091	2	5.30012	4.97096	34
	20	0.00089	2	5.30014	4.97130	34
	30	0.00087	2	5.30016	4.97163	33
	40	0.00085	2	5.30018	4.97197	34
	50	0.00083	2	5.30020	4.97231	34
			2			33
46	0	0.00081		5.30022	4.97264	
	10	0.00079	2	5.30024	4.97298	34
	20	0.00077	2	5.30026	4.97331	33
	30	0.00075	2	5.30028	4.97365	34
	40	0.00074	1	5.30029	4.97398	33
	50	0.00072	2	5.30031	4.97432	34
			2			33
47	0	0.00070		5.30033	4.97465	
	10	0.00068	2	5.30035	4.97499	34
	20	0.00066	2	5.30037	4.97532	33
	30	0.00065	1	5.30038	4.97565	33
	40	0.00063	2	5.30040	4.97599	34
	50	0.00061	2	5.30042	4.97632	33
			1			33

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
48	0	0.00060		5.30043	4.97665	
	10	0.00058	2	5.30045	4.97699	34
	20	0.00056	2	5.30047	4.97732	33
	30	0.00055	1	5.30048	4.97765	33
	40	0.00053	2	5.30050	4.97798	33
	50	0.00052	1	5.30051	4.97832	34
			2			33
49	0	0.00050		5.30053	4.97865	
	10	0.00049	1	5.30054	4.97898	33
	20	0.00047	2	5 30056	4.97931	33
	30	0.00046	1	5.30057	4.97964	33
	40	0.00044	2	5.30059	4.97997	33
	50	0.00043	1	5.30060	4.98030	33
			2			33
50	0	0.00041		5.30062	4.98063	
	10	0.00040	1	5.30063	4.98096	33
	20	0.00039	1	5.30064	4.98129	33
	30	0.00037	2	5.30066	4.98162	33
	40	0.00036	1	5.30067	4.98195	33
	50	0.00035	1	5.30068	4.98228	33
			2			33
51	0	0.00033		5.30070	4.98261	
	10	0.00032	1	5.30071	4.98293	32
	20	0.00031	1	5.30072	4.98326	33
	30	0.00030	1	5.30073	4.98359	33
	40	0.00029	1	5.30074	4.98392	33
	50	0.00028	1	5.30075	4.98425	33
			2			32
52	0	0.00026		5.30077	4.98457	
	10	0.00025	1	5.30078	4.98490	33
	20	0.00024	1	5.30079	3.98523	33
	30	0.00023	1	5.30080	4.98555	32
	40	0.00022	1	5.30081	4.98588	33
	50	0.00021	1	5.30082	4.98620	32
			1			33
53	0	0.00020		5.30083	4.98653	
	10	0.00019	1	5.30084	4.98686	33
	20	0.00018	1	5.30085	4.98718	32
	30	0.00017	1	5.30086	4.98751	33
	40	0.00017	0	5.30086	4.98783	32
	50	0.00016	1	5.30087	4.98816	33
			1			32

M.	S.	Log. ½ elap. Time.	Com. Diff.	Log. Mid. Time.	Log. Rising.	Difference.
54	0	0.00015		5.30088	4.98848	
	10	0.00014	1	5.30099	4.98880	32
	20	0.00013	1	5.30090	4.98913	33
	30	0.00013	0	5.30090	4.98945	32
	40	0.00012	1	5.30091	4.98978	33
	50	0.00011	1	5.30092	4.99010	32
			1			32
55	0	0.00010	0	5.30093	4.99042	
	10	0.00010	0	5.30093	4.99074	32
	20	0.00009	1	5.30094	4.99107	33
	30	0.00008	1	5.30095	4.99139	32
	40	0.00008	0	5.30095	4.99171	32
	50	0.00007	1	5.30096	4.99203	32
			0			32
56	0	0.00007		5.30096	4.99235	
	10	0.00006	1	5.30097	4.99267	32
	20	0.00006	0	5.30097	4.99300	33
	30	0.00005	1	5.30098	4.99332	32
	40	0.00005	0	5.30098	4.99364	32
	50	0.00004	1	5.30099	4.99396	32
			0			32
57	0	0.00004		5.30099	4.99428	
	10	0.00003	1	5.30100	4.99460	32
	20	0.00003	0	5.30100	4.99492	32
	30	0.00003	0	5.30100	4.99524	32
	40	0.00002	1	5.30101	4.99556	32
	50	0.00002	0	5.30101	4.99587	31
			0			32
58	0	0.00002		5.30101	4.99619	
	10	0.00001	1	5.30102	4.99651	32
	20	0.00001	0	5.30102	4.99683	32
	30	0.00001	0	5.30102	4.99715	32
	40	0.00001	0	5.30102	4.99747	32
	50	0.00001	0	5.30102	4.99778	31
			1			32
59	0	0.00000		5.30103	4.99810	
	10	0.00000	0	5.30103	4.99842	32
	20	0.00000	0	5.30103	4.99873	31
	30	0.00000	0	5.30103	4.99905	32
	40	0.00000	0	5.30103	4.99937	32
	50	0.00000	0	5.30103	4.99968	31
			0			32
0	0	0.00000		5.30103	5.00000	

EXAMPLES.

EXAMPLE I.

BEING at Sea in the Latitude of 47°. 19′. N. by Account, when the Sun's Declination was 12°. 16′. N. at 10ʰ. 24′. A.M. per Watch, ⊙'s Altitude was found 49°. 09′. and at 1ʰ. 14′. P.M. per Watch, his Altitude was found 51°. 59′. : Required the true Latitude.

Times.	Altit.	Natur.		D.M.
H.M.S.	D.M.	Sines.	Lat.	47.19—0.16880
10.24.00,	49.09—	75642,	⊙Dec.	12.16—0.01003
1.14.00,	51.59—	78783,	Log. Rat.	—0.17883
Elap. Time	—2.50.00	3141	its Logar.	—3.49707
½ Elap. Time	—1.25.00, its Log. in Col. of ½ elap. Time is			0.44077
0.15.00, in Col. of M.T. correſponding to				4.11667
Time at Noon	1.10.00 its Log. from Col. of L. Riſing is			3.66542
D° per Watch	1.14.00		Log. Ratio	0.17883
Watch faſt —	0. 4.00	3066 nat. Num. of this Log.		3.48659
		78783 nat. Sine of greateſt Alt.		
	D. M.			
⊙ Mer. Alt.	54.56 =	81849 nat. Sine of ⊙'s Mer. Alt.		
⊙ Zen. Diſt.	35. 4			
⊙ Declin.—	12.16 North.			
Latitude —	47.20 North.			

Here the Latitude found by Computation may be relied on as the true Latitude of the Place of Obſervation, ſeeing it differs only One Mile from the Latitude uſed in the Operation.

N. B. By ☉'s *Altitude* is always meant the *Altitude* of the Sun's Center; for obtaining which at Sea the uſual, and indeed the beſt, Method is, with a well-adjuſted *Hadley*'s Quadrant, to obſerve the Altitude of his lower Limb above the Horizon of the Sea, which being cleared of the Effects of Refraction, and the Dip of the viſible Horizon, according to the Tables for that Purpoſe, and the Semi-diameter of the Sun added thereto will give the correct Altitude of his Center, as follows:

Suppoſe the apparent Alt. of ☉'s lower Limb was obſerved 48°. 58′. above the Horizon of the Sea, the Obſerver's Eye being elevated 20 Feet above the Surface of the Water: Required the correct Altitude of his Center.

	D.M.
Obſerved Altitude — — — —	48.58
Refraction — — — — — — — —	0. 1
	48.57
Horizontal Dip — — — — — —	0. 4
	48.53
Semi-diameter of ☉ — — — —	+16

Correct Altitude of ☉'s Center—49.09 being the 1ſt Altitude in the foregoing Example.

EXAMPLE II.

Being at Sea in 50°. 40′. North Latitude by Account, when ☉'s Declination was 20°. 00′. South, at 10ʰ. 17′. A. M. per Watch, ☉'s Altitude was found 17°. 13′. and at 11ʰ. 17′. A. M. per Watch it was found 19°. 41′: Required the Latitude.

Times.

Times.	Altit.	Natur.	D.M.
H.M.S.	D.M.	Sines.	Lat. 50.40—0.19803
10.17.00	17.13	=29599 ⊙	Dec. 20.00—0.02701
11.17.00	19.41	=33682	
			Log. Rat. —0.22504
Elap. Time —	1.00.00	4083	—3.61098
½ Elap. Time —	0.30.00		—0.88430
	1. 0.50		—4.72032
Time from Noon	0.30.50		—2.95599
D°. per Watch	0.43.00		—0.22504
Watch flow —	0.12.10	538	—2.73095

33682 D.M.

Natural Sine of ⊙ Merid. Altitude =34220=20.01=⊙ Alt.

69.59=⊙Z.D.
20. 0=⊙Dec.

49.59 Lat.

As the Latitude, by this Computation, differs 41 Miles from that by Account, it is proper to repeat the Operation, using the laſt-found Latitude inſtead of that by Account. D.M.

49.59—0.19178
20.00—0.02701

Log. Ratio—0.21879
3.61098
0.88430

	H.M.S.		
½ Elap. Time —	0.30.00		
	1.00.00		—4.71407
	0 30.00		—2.93223
	0.43.00		0.21879
Watch flow —	0.13.00	517	—2.71344

33682 D.M.

34199=20.00

70.20=⊙ Zen. Diſt.
20.00=⊙ Declin.

50.00=Lat.

The

The Latitude laſt-found, differing only One Mile from that uſed in the Operation, may be relied on as the true Latitude. It is evident that the Operation is repeated with very little additional Trouble, but few Alterations being neceſſary.

EXAMPE III.

Being at Sea in the Latitude of 60°. 0′. North by Account, when the Sun was in the Equator, and, conſequently had no Declination, at 1ʰ. 0′ P.M. per Watch, his Altitude was 28°. 53′, and at 3ʰ. 0′, P.M. per Watch, it was 20°. 42′. : Required the true Latitude.

Times.			D.M.
H.M.S.	D.M.		
1.00.00	28.53	=48303	
3.00.00	20.42	=35348	Log. Ratio=0.30103
2.00.00		12955	—4.11244
½ Elap. Time — 1.00.00			—0.58700
2.00.00			5.00047
Time from Noon 1.00.00			—3.53243
D° p. Watch — 1.00.00			Log. Ratio=0.30103
		1703	—3.23140

48303

D.M.

50006=30.00=⊙ Merid. Alt.

60.00 Latitude.

Lat. 60.00=0.30103
⊙Dec. 00.00=0.00000

Here the Latitude by Computation comes out the ſame with the Latitude by Account, which ſhews that the Latitude by Account was right. From the foregoing Examples it is plain that the Operation is the ſame, whether the Sun hath North or South Declination : And it will be the ſame whether the Ship is in North or South Latitude. It is alſo clear that, when the Sun has no Declination, the arithmetical Complement of the Log. Coſine of the Latitude is the *Log. Ratio.*

Hitherto it has been ſuppoſed that both the Altitudes were taken at the ſame Place or Station : But as that can ſeldom be

the

the Caſe at Sea, the neceſſary Correction for any Alteration of Station may be readily made as follows:

Let the Bearing of the Sun, at the Inſtant of the Firſt Obſervation, be taken by Compaſs (which call ⊙*'s Bearing*); and when the Second Obſervation is taken, find how far the Ship hath gone, in the Time between the Obſervations, towards, or farther from, that Point of the Horizon in which the Ship was found at the Firſt Obſervation. This Quantity, added to the Firſt-obſerved Altitude, if the Ship hath moved towards the aforeſaid Point, or ſubtracted from the Firſt Altitude, if the Ship hath gone farther from the ſaid Point, will reduce the Firſt Altitude to what it would have been found, if obſerved at the ſame Station where the Second Altitude was taken.

Thus ſuppoſe that when the Sun bore S. E. $\frac{1}{2}$ E. by Compaſs, his Altitude was obſerved 18°. 27′.; and Three Hours after it was obſerved 38°. 23′. the Ship in the mean time having gone S. E. $\frac{1}{2}$ E. by Compaſs at the Rate of Six Knots per Hour: Required what the Firſt Altitude would have been found, if it had been obſerved at the ſame Station with the Second Altitude.

Here the Ship's Courſe being directly towards that Point of the Horizon the Sun bore on when the Firſt Altitude was taken, the whole Diſtance run between the Obſervations, viz. 18 Miles, muſt be added to the Firſt Altitude, which will bring it to what it would have been found if obſerved at the Station where the Second Altitude was taken. So that the Two Altitudes for finding the Latitude of the laſt Station will be 18°. 45′. and 38°. 23′.

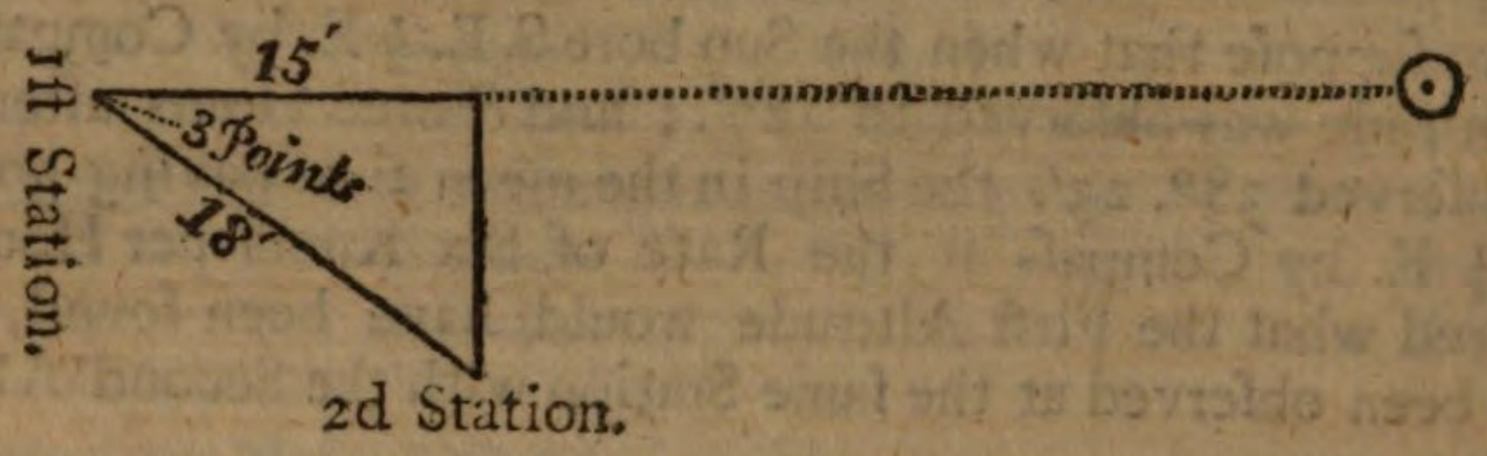
Had the Ship's Courſe been N. W. $\frac{1}{2}$ W. or directly from the Point that the Sun bore on at the Time of the Firſt Obſervation, in that Caſe the 18 Miles muſt have been ſubtracted from the Firſt-obſerved Altitude.

When the Ship's Courſe makes an Acute or Obtuſe Angle with the ⊙'s Bearing, the Diſtance gone towards, or from, that Point of the Horizon may be readily found by Help of the Table of Difference of Latitude and Departure.

Thus

Thus ſuppoſe that when the Sun bore S. E. by S. by Compaſs, his Altitude was 26°. 50′.; and after ſailing 18 Miles on a South Courſe by Compaſs, his Altitude was 37°. 10′.: Required what the Firſt Altitude would have been, if obſerved at the Station where the laſt Altitude was taken.

Here the Ship's Courſe making an Angle of Three Points, or 33°. 45′. with the ☉'s Bearing, find in the Table of Difference of Latitude and Departure, what the Difference of Latitude will be, when the Courſe is 3 Points, and the Diſtance 18 Miles, and you will have 15 Miles to be added to the Firſt Altitude, the Ship having gone ſo much towards the Point of the Horizon that the Sun then bore on, as is plain from the Figure.



So that the Two Altitudes to be uſed for finding the Latitude of the Second Station are 27°. 05′. and 37°. 10′.

Had the Ship's Courſe been North, or Three Points from the Point oppoſite to the ☉'s Bearing, in that Caſe the 15 Miles muſt have been ſubtracted from the Firſt Altitude.

When the Ship's Courſe is at Right Angles to the ☉'s Bearing, or Eight Poiuts from it; in that Caſe there is no Correction neceſſary.

Example: Suppoſe a Ship ſailing 7 Knots per Hour, on an E. ½ S. Courſe, by Compaſs, at 9ʰ. 55′. 30″. A. M. per Watch obſerved ☉ Altitude 17°. 33′. bearing S. by E. ¼ E. by Compaſs, and at 0ʰ. 54′. 10″. P. M. per Watch obſerved ☉'s Altitude 21°. 55′.: Required the Latitude of the Ship when the laſt Altitude was taken, the Latitude by Account being then 47°. 34′. North, and the Sun's Declination 19°. 30′. South.

The

The Ship's Courſe makes an Angle of 6¼ Points with the ⊙'s Bearing, and the Diſtanee run between the Obſervations is 21 Miles; therefore from the Table of Difference of Latitude and Departure take out the Difference of Latitude anſwering to that Courſe and Diſtance, which is 7 Miles, to be added to the Firſt-obſerved Altitude, the Ship having gone ſo much towards the Point of the Horizon that the Sun then bore on; ſo the Two Altitudes to be uſed for finding the Latitude of the laſt Station are 17°. 40′. and 21°. 55′.

	D.M.			D.M.
1ſt Alt.	17.33			
Cor.—	+ 7	Nat.		
		Sines.	Lat. 47.34—	0.17087
H.M.S.	17.40—	30348	⊙ Dec. = 19.30—	0.02565
9.55.30	21.55—	37326		
0.54.10			Log. Ratio	0.19652
		6978		3.84373
2.58.40				
½ Elap. Time 1.29.20				0.42022
0.33.10				4.46047
Time fr. Noon 0.56.10				3.47539
D°. p. Watch 0.54.10				0.19652
Watch ſlow — 0. 2.00				
		1901		3.27887
Natural Sine of greateſt Altitude —		37326		
		D.M		
Natural Sine of ⊙ Merid. Alt. —		39227 = 23.06	⊙ M. A.	
			66.54	⊙ Zen.D.
			19.30	⊙ Decl.
			47.24	Lat.

Example 2d, *December* 21ſt, 1759. A Ship from the Bay of *Biſcay* bound into the *Engliſh* Channel, ſailing N. by E. ¾ E. by Compaſs, at the Rate of 9 $\frac{6}{10}$ Knots per Hour, at 10ʰ. 00′. A. M. per Watch obſerved ⊙'s Altitude 13°. 20′. bearing S. ¾ E. by Compaſs, and at 1°. 40′. P. M. per Watch ⊙'s Altitude was 14°. 15′. the Latitude by Account being then 49°. 17′. N. Required the true Lat. In this Example, ⊙'s Bearing at the Time of the Firſt Altitude is S. ¾ E. the oppoſite Point thereto

thereto is N. $\frac{3}{4}$ W. with which Rhomb the Ship's Courſe, viz. N. by E. $\frac{3}{4}$ E. makes an Angle of $2\frac{1}{2}$ Points, and the Diſtance ſailed between the Obſervations is 35 Miles; therefore the Difference of Latitude anſwering to the Diſtance of 35 Miles on a Courſe of $2\frac{1}{2}$ Points, viz. 31 Miles, is the Correction to be ſubtracted from the Firſt-obſerved Altitude, the Ship having gone ſo far, in the Time between the Obſervations, from the Point of the Horizon that the Sun then bore upon.

	D.M.			
Firſt-obſerved Altitude	13.20			
Correction — — — — —	0.31		D.M.	
H. M. S.	——		Lat. 49.17 =	0.18554
10.00.00	12.49	—22183 ⊙	Dec. 23.28 =	0.03749
1.40.00	14.15	—24615		——
——		——	Log. Ratio	0.22303
3.40.00		2432 — — — —		3.38596
$\frac{1}{2}$ Elap. Time— 1.50.00 — — — — — — — — —				0.33559
0.10.10 — — — — — — — — —				3.94458
——				——
Time from Noon 1.39.50 — — — — — — — — —				3.97028
D° p. Watch — 1.40.00				0.22303
——				——
Watch faſt — — 0.10		5588 — — — — —		3.74725
		24615		
		——	D.M.	
		30203 =	17.35 = ⊙ Mer. Alt.	
			——	
			72.25 = ⊙ Zen. Diſt.	
			23.28 = ⊙ Declin.	
			——	
			48.57 = Latitude.	

The Latitude by Computation being 20 Miles different from that by Account, the Work muſt be repeated with the laſt-found Latiude.

48.57

D.M.
48.57 = 0.18262
23.28 = 0.03749

Log. Ratio — 0.22011

H.M.S. 2432 — — — — — — 3.38596
1.50.00 — — — — — — — — — 0.33559

0.10.00 — — — — — — — — — 3.94166

1.40.00
1.40.00

397170
0.22011

5644 — — — — — — 3.75159
24615 D.M.
30259 — 17.37 = ⊙ Merid. Alt.

72.23 = ⊙ Zen. Dift.
23.28 = ⊙ Declin.

Being the exact Latitude — — 48.55

Example 3d. On *October* the 28th, 1766. A Ship failing N. E. ½ E. by Compafs, at the Rate of 6 Knots per Hour, at 11h. 28′. 20″. A. M. per Watch, the Altitude of ⊙'s lower Limb was obferved 28°. 18′. above the Horizon of the Sea, the Obferver's Eye being elevated above the Surface of the Water 20 Feet, ⊙'s Bearing by Compafs being at the fame Time S. by W.; and at 2h. 58′. 20″. P. M. per Watch, the Altitude of ⊙'s lower Limb was obferved 16°. 40′. above the Horizon, the Obferver's Eye being elevated as before, the Latitude by Account at the Time of the laft Altitude being 47°. 50′. North: Required the true Latitude of that Station.

	D.M.	D.M.
Firft-obferv'd Alt. of ⊙'s low Limb —	28.18	Second D°. 16.40
Refraction to be fubtracted — — — —	—2	Refr. — — — 3
Altit. clear'd of Refraction — —	28.16	16.37
Dip of Horizon to be fubtracted — —	—4	— — — — —4
	28.12	16.33
⊙'s ½ Diameter to be added — —	+16	— — — — +16
Correct Altitude of Center — — —	28.28	Second D°. 16.49

Here the Ship's Courſe makes an Angle of $3\frac{1}{2}$ Points with the Point oppoſite to the ⊙'s Bearing at the Firſt Obſervation; and the Diſtance ſailed in the elapſed Time is 21 Miles, which, in the Table of Difference of Latitude and Departure, gives 16 Miles to be ſubtracted from the Firſt Altitude; therefore 28°. 28′. — 0°. 16′. = 28°. 12′. is the Firſt Altitude, and 16°. 49′. is the Second Altitude to be uſed for finding the Latitude of the laſt Station.

	Times p. Watch.	Alti- tudes.	Natur. Sines.		
				Lat. 47.50	—0.17309
	H. M. S.	D. M.		⊙ Dec. 13.17	—0.01178
	11.28.20	28.12	—47255		
	2.58.20	16.49	—28931	Log. Ratio	—0.18487
	3.30.00		18324	— — — —	—4.26302
½ Elap. Time —	1.45.00	— — — — — — — — —			—0.35430
	1.14.00				4.80219
Time from Noon	0.31.00	— — — — — — —			2.96067
D°. p. Watch	—0.31.40				0.18487
Watch ſlow	—0. 0.40	Nat. Num.	597	— — —	—2.77580
Natural Sine of greateſt Altitude			—47255		
				D. M.	
Natural Sine of ⊙ Merid. Alt.		—	47852	= 28.35	= ⊙ M. Alt.
				61.25	= ⊙ Z. Diſt.
				13.17	= ⊙ Declin.
				48. 8	Latitude.

Had the Variation of the Compaſs been applied both to the Ship's Courſe and ⊙'s Bearing, it would not have made any Difference in the Operation or Reſult, as the Angle formed by them will be the ſame, whether they are both eſtimated by Compaſs, or when the Variation is allowed in both.

REMARKS

REMARKS AND CAUTIONS

TO BE ATTENDED TO

IN THE USE OF THE FOREGOING TABLES;

COMMUNICATED

BY THE ASTRONOMER ROYAL.

I. THE foregoing Tables are adapted to a Table of Natural Sines conſiſting of Five Places of Figures, when at the greateſt: Therefore, if the Table of Natural Sines made Uſe of ſhould conſiſt of Six Places of Figures when greateſt, the laſt Figure to the Right Hand muſt be left out; or if it ſhould conſiſt of Seven Places of Figures when greateſt (as is the Caſe of SHERWIN's Logarithms) the Two laſt Figures to the Right Hand muſt be left out.

II. If the Second of the Two Altitudes obſerved be the greateſt, then the Difference of the $\frac{1}{2}$ elapſed Time and the middle Time is its Diſtance from Noon; but if the Second Altitude be the leaſt, the Sum of the $\frac{1}{2}$ elapſed Time and middle Time is its Diſtance from Noon.

III. In reducing the Firſt Altitude of the Sun to the Station of the Second Altitude; by the Ship's Courſe by Compaſs is to be underſtood its Courſe made good; Leeway, if any, being firſt allowed, or the Courſe by Compaſs corrected for Leeway only, but not for the Variation.

The

The following CAUTIONS about chuſing out the proper Times for making the OBSERVATIONS are taken from THE BRITISH MARINER'S GUIDE, p. 76.

I. THE Two Obſervations muſt be always taken between Nine in the Morning and Three in the Afternoon; but the nearer they are to Noon the better; provided there be a ſufficient Interval between them. The following Directions will ſhew what Interval is proper.

II. If both Obſervations are in the Forenoon, the Interval of Time between them muſt not be much leſs than Half the Diſtance of the Firſt Obſervation from Noon.

III. If both Obſervations are in the Afternoon, the Interval between them muſt not be much leſs than the Diſtance of the Firſt Obſervation from Noon.

IV. If One Obſervation is in the Forenoon and the other in the Afternoon, the Interval of Time muſt not exceed 4 ½ Hours.

V. If the Sun's Meridian Zenith Diſtance be conſiderably leſs than the Latitude of the Place, then the Obſervations muſt be taken proportionably nearer to Noon. Thus, if the Latitude be double the Sun's Meridian Zenith Diſtance, the Firſt of Two Obſervations taken in the Forenoon muſt not be before 9 ½ A. M. nor the Second before 10 ¾ A. M. or the Firſt of Two taken in the Afternoon muſt not be taken after 1 ¼ P. M. nor the Second after 2 ½ P. M. and if One Obſervation be taken in the Forenoon, and the other in the Afternoon, that in the Forenoon muſt not be taken before 9 ½ A. M. nor muſt the Interval between that and the Afternoon Obſervation be above 3 ½ Hours. If the Latitude be Three Times the Sun's Meridian Zenith Diſtance, the Firſt of Two Obſervations taken in the Forenoon muſt not be before 10 A.M. nor the Second before 11 A.M. or the Firſt of Two

taken

taken in the Afternoon muſt not be after 1 P. M. nor the Second after 2 P. M. Or, if One be taken in the Forenoon, and the other in the Afternoon, that in the Morning muſt not be before 10 A.M. and the Interval between them muſt not be above Three Hours. If the Latitude be Five Times the Sun's Meridian Zenith Diſtance, the Firſt of Two Obſervations taken in the Forenoon muſt not be before 10 $\frac{1}{2}$ A.M. nor the Second before 11 $\frac{1}{4}$ A.M. or the Firſt of Two taken in the Afternoon muſt not be after 0 $\frac{3}{4}$ P. M. nor the Second after 1 $\frac{1}{2}$ P. M. Or, if One be taken in the Forenoon, and the other in the Afternoon, the Morning One muſt not be before 10 $\frac{1}{2}$ A. M. nor the Interval between them be above 2 $\frac{1}{4}$ Hours. If the Latitude be Twelve Times the Sun's Meridian Zenith Diſtance, the Firſt of Two Obſervations taken in the Forenoon muſt not be before 11 A.M. nor the Second before 11 $\frac{1}{2}$ A. M. or the Firſt of Two taken in the Afternoon muſt not be after 0 $\frac{1}{2}$ P. M. nor the Second after 1 P. M. Or, if One be taken in the Forenoon and the other in the Afternoon, the Morning One muſt not be before 11 A. M. nor the Interval between them be above 1 $\frac{1}{2}$ Hours. But if the Sun's Meridian Zenith Diſtance be ſtill leſs in proportion to the Latitude, it will be neceſſary to take the Obſervations ſo much nearer to the Noon, that the Advantage of the Method will be very much diminiſhed.

☞ If theſe Cautions are uſed, the Latitude computed will be at leaſt Five Times nearer the Truth than the Latitude by Account; and therefore the Error of the Latitude computed will not be above $\frac{1}{4}$th of the Difference between them; whence a Judgment may be formed, whether it will be neceſſary or not to repeat the Calculation over again with the Latitude found inſtead of the Latitude by Account.

F I N I S.

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London 1769

Eph.astr. 1 d-1770/71#Beibd.2
urn:nbn:de:bvb:12-bsb10625889-8